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PROEFSCHRIFT

ter verkrijging van de graad van doctor aan de Universiteit van Tilburg, op gezag van de rector magnificus, prof. dr. Ph. Eijlander, in het openbaar te verdedigen ten overstaan van een door het college voor promoties aangewezen commissie in de aula van de Universiteit op vrijdag 16 september 2011 om 10.15 uur door

MOAZZAM FAROOQ

geboren op 12 december 1979 te Karachi, Pakistan.

Promotores:	Prof. dr. Steven Ongena
	Dr. Lieven Baele
Promotiecommissie:	Prof. dr. Thorsten Beck
	Prof. dr. Vasso Ioanniduo
	Dr. Alberto Manconi

To:

My Parents, Naheed, Waseem, Nawal,
Nazia, Mubashir and Mudassir

Acknowledgements

It is unconventional to open Ph.D. dissertation with a gloomy note, but the most overwhelming event while working on this dissertation was - loss of my sister. She passed away five months ago in a road accident on her way back to home from university where she was at ABD stage of Ph.D. in chemistry. The food supplements that she gave me to keep me energetic considering my unruly eating habits outlived her, may her soul rest in eternal peace.

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Moazzam Farooq
Tilburg. June 28, 2011

Contents

1

Introduction

This thesis comprises four papers, the first paper, "Literature Survey and Anatomy of Islamic Banking", provides an overview of Islamic banking products and documents a survey of empirical literature on Islamic banking. Following the financial crisis, there has been a renewed interest in Islamic banking. This interest was accompanied by an influx of practitioner and academic literature on the subject. More importantly, new empirical work has emerged that sheds light on the empirical validation of theory that existed long before and various aspects of Islamic banking as it is practiced. Aim of this paper is to study key products used in Islamic banking and survey existing literature on the subject to set ideas in perspective. Survey of empirical work is the focus of this paper; however, reference to the theoretical work is made as well whenever necessary. This paper also serves as a preamble to the second paper which is an empirical paper on Islamic banking.

The second paper, "Of Religion and Redemption: Evidence from Default on Islamic Loans" is a joint work with Lieven Baele and Steven Ongena. This paper compares default rates on conventional and Islamic loans using a comprehensive monthly dataset from Pakistan that follows more than 150,000 loans over the period 2006:04 to 2008:12.

The results suggest that the default rate on Islamic loans is less than half the default rate on conventional loans. Islamic loans are less likely to default during Ramadan and in big cities if the share of votes to religious-political parties increases, suggesting that religion – either through individual piousness or network effects – may play a role in determining loan default.

The third paper "Financial Reforms and Monetary Policy Transmission in Sub-Saharan Africa", studies interest rate pass-through in selected Sub-Saharan African countries and links the speed of pass-through to the ongoing financial reforms. The empirical results suggest that (a) in all SSA countries, save South Africa and Swaziland, interest rate pass-through is weak both in terms of initial and long run responses and pass-through is not static over time, (b) major differences in pass-through in different countries exist in the sample, and (c) financial reforms positively affect interest rate pass-through albeit with a lag.

The fourth and final paper "Financial Constraint and Stock Returns - Evidence from G-7 Countries", analyses the contribution of a Financial Constraint (FC) factor in explaining cross-sectional variation in expected stock returns in G-7 countries and attempts to relate this factor to the differences in GDP growth rates and development of banking sector and equity market. The results show that Financial Constraint factor is significantly positive for portfolios with smaller firms or value firms. The Financial Constraint factor is especially significant for portfolios at the intersection of Small-Value firms. The significance of Financial Constraint factor persists across all G-7 countries and in sub-periods as well. This factor does not replace any of the three standard Fama-French Factors as they remain significant when the Financial Constraint Factor is introduced. These results also confirm the presence of a size and value factor in G-7 markets.

Moreover, cross-country differences in the GDP growth rates, banking sector development, and equity market development do not appear to have any noticeable effect on the size or significance of the coefficient of FC factor. However, in sub-periods within a country, there is some evidence of a relationship between the GDP growth rate and the coefficient of FC factor as generally higher average GDP growth rate coincides with bigger and more significant coefficient of FC factor. This paper lends support to a broader asset pricing model including the Financial Constraint factor along with the standard Fama-French factors. These findings have important implications for asset pricing.

2

Literature Survey and Anatomy of Islamic Banking

2.1 Introduction

Islamic banking is an offshoot of Islamic economics. Muhammad Iqbal and Sayyid Abu Al-A'la Maududi from India and Pakistan, and Baqir Al-Sadr and Sayyid Qutb from the Arab world are credited with and sometimes accused of pioneering the concept of Islamic economics in 1940's and 1950's (El-Gamal (2003), Kuran (1996)). Kuran (1996) credits Sayyid Abu'l-A'la Maududi with coining the term Islamic economics.

Al-Sadr (1982) succinctly defines Islamic Economics as *'the way Islam prefers to follow in the pursuit of its economic life and in the solution of its practical economic problems in line with <u>its</u> concept of justice'*

Among other more subtle differences with mainstream economics, the most striking difference of Islamic economics is prohibition of *riba*[1]. *Riba* is generally translated as interest and in this chapter, I will use the term interest to denote *riba*.

[1] *Riba* is generally translated as interest, but it has a broader scope. There is near unanimous consensus among Islamic jurists that the interest in conventional banking is *riba*.

Interest is personified in key operations of banks, therefore, attention of scholars was swiftly shifted to the ways and modes of Islamization of banking operations. Uzair (1955) devised the first model of an Islamic bank on the basis of two tier *mudaraba*[2]. The concept of *murabaha* or mark-up based financing as a mode of Islamic finance crept in later in 1976. Since its introduction, the mark-up based modes have been predominant form of financing in the Islamic financial institutions. (Khan (1996)).

The prohibition of interest is canonical[3], one stated reason of this prohibition is fair and just treatment of parties in a transaction[4]. However, proponents of Islamic economics and banking have vigorously attempted to provide economic justifications of this prohibition by advancing arguments against interest based on efficiency, stability and growth (Siddiqi (1983)). Some scholars believe that interest based transactions are unjust because rate of return for the lender is pre-specified or guaranteed whereas the rate of return for the borrower is stochastic. This view is favored by Maududi (1961), Maududi (st. 1950), Siddiqi (1967) and Siddiqi (1988). However, in general the rate of return that a lender ends up earning is not necessarily pre-determined or guaranteed in a conventional loan transaction. In most of the lending transactions to commercial entities, lenders are entitled to receive higher of the principal plus interest or the salvage value of firm. Thus in the event of losses in excess of equity of a borrowing firm, the lenders to that firm share in losses.

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[2] *Mudaraba* is a form of partnership in which capital is provided by one party and skills/labour by the other. We will define and describe mudaraba later in the paper.

[3] "That is because they say: 'Trading is only like riba,' whereas Allah has permitted trading and forbidden *riba*." (Al-Quran, 2:275). From this verse, it follows that Quranic stance is that likeness of trading (on credit) and *riba* does not make interest valid, interest is prohibited based on divine authority.

[4] "O you who believe! fear Allah and give up what remains of your demand for interest, if you are indeed believers. If you do it not, take notice of war from Allah and His Messenger: but if you repent you shall have your capital sums; *deal not unjustly and ye shall not be dealt with unjustly*" (Al Quran, 2:278-279)

If fixed returns of one party is the real cause of injustice and the only reason for the prohibition of interest, then naturally a non-interest based Islamic banking system has to be modeled on profit and loss sharing (PLS) basis. This belief was the reason why theoretical models of Islamic banking were based on PLS and still considered as ideal or true modes of Islamic banking by scholars like Usmani (1998) and Siddiqui (2002) among many others.

Other scholars disagree with the view that it is the fixed nature of interest that is at the core of prohibition of interest. Homoud (1974) held this opinion, and pioneered the use of mark-up based modes in Islamic banking, Ismail (1989) also attests this opinion (Khan (1996)). Usmani (1998) considers mark-up based modes as Islamic, but cautions that non-PLS modes should be used only when necessary. El-Gamal (2007) describes the prohibition of interest as prohibition of 'unbundled credit' and contends that the essence of this prohibition lies in economic efficiency considerations (El-Gamal (2000)). El-Gamal (2007) proposes, that the solution of implementing the form and substance of *Shari'ah* lies in adoption of mutual structures of financial intermediation.

It may be noted that while promoting Islamic economics or banking, both the jurists and economists make appeals to economic and/or social benefits. The earlier text in favor of Islamic economics often portrays the lender as an exploitative character that takes advantage of the poor borrower and enjoys guaranteed returns. Later this characterization was somewhat changed, where bank was depicted as exploiting depositors by giving unfair returns and exploiting borrowers by giving expensive loans (see Maududi (st. 1941), Maududi (st. 1950), Maududi (1961) and Siddiqui (2002)).

Rest of the chapter proceeds as follows, Section I provides an overview of the structure of Islamic banks, Section II describes key Islamic banking products used by Islamic

banks to mobilize deposits and provide financing, in Section III I provide a survey of empirical literature on Islamic banking and Section IV concludes.

2.2 Structure of Islamic Banks

A simplified balance sheet of a typical Islamic bank is given in Figure 2.1. The balance sheet has been deliberately simplified for the sake of exposition.

Figure 2.1
Simplified version of balance sheet of a hypothetical Islamic bank

Uses of Funds	Sources of Funds
Cash & Balances	Qard
Investments	Saving Accounts Term Deposits
Financing Murabaha Ijarah Ijarah wa's Iqtina Istisna Salam	Shareholders' Equity
Diminishing Musharakah	
Modaraba Musharakah	
Fixed Assets	

Islamic banks fund themselves with equity, profit and loss sharing checking deposits (saving accounts), profit and loss sharing term deposits (also called Investment Accounts) and non-return paying current deposits (*qard*). Both types of profit and loss sharing deposits are legally not a liability of the bank and their nominal amount is not guaranteed, but for the purpose of capital adequacy requirements, these deposits are treated as liability

of the bank rather than a part of equity. In the rest of the chapter, I will refer both of these accounts as PLS deposits.

Qard is considered as a loan to the bank, it does not earn any return but the bank guarantees its nominal value.

Banks use these funds to finance their assets that include cash, investments and financing products that are permissible according to *Shari'ah* and are described in the next section.

In the absence of qard and equity, Islamic banks act as manager of the funds provided by PLS depositors and participate in the profit generated from the operations. However, Islamic banks do have equity and qard as well, and they generally comingle these funds with the PLS deposits. In this case other than managing the funds of depositors, banks also invest their own funds (equity), and also take a leveraged bet by using qard as well to fund their financing/ investing activities.

It is important to note that qard is solely a liability of the bank, not a liability of PLS depositors. In the event of loss, the PLS depositors absorb losses proportional to their share in financing/ investments made by the bank. To illustrate this, suppose an Islamic bank has PLS deposits of $ 45, qard of $45, equity of $10 and it makes an investment of $100 in a risky asset. Suppose the value of this asset is reduced to $90, as a result the bank suffers a loss of $ 10. This loss will be distributed proportional to the share of investment of each party in the following way. PLS depositors will absorb loss of $4.5, and bank will absorb a loss of $5.5 ($1 on equity and $4.5 on the qard invested by bank). It may be noted that, in a conventional bank, the bank has to absorb the total loss of $10 so, the presence of PLS deposits provide extra cushion to the bank to absorb losses by decelerating the erosion of equity.

If the investment in the risky asset results in a profit of $10, and the bank and PLS depositors have agreed to a profit sharing ratio of 50-50 then the respective shares of the bank and depositors in the profit will be as follows. The bank will keep the profit proportional to her own investment, that is, $5.5 ($ 1 on equity, and $4.5 on the qard that bank invested in the assets on its own risk). Moreover, from the return accrued on the share of investment of PLS depositors ($4.5), the bank will keep a share of $2.25 as its share as manager (mudarib), thus PLS depositors will receive $2.25. Qard providers, by definition do not participate in the profits generated by the bank.

A graphical depiction of the impact of changes in the value of bank's asset on the value of PLS deposits, equity and qard is given in Figures 2.2 and 2.3.

Figure 2.2
This Figure shows the impact of changes in the value of a hypothetical conventional and Islamic bank's assets on the value of PLS deposits and equity of an Islamic bank and deposits and equity of a conventional bank.

Both banks are assumed to have deposits of $90, and Equity of $10. All $100 available with the bank are invested in a risky asset. The profit sharing ratio between Islamic bank and her depositors is 50-50. Conventional bank pays a guaranteed flat interest of 8% to her depositors.

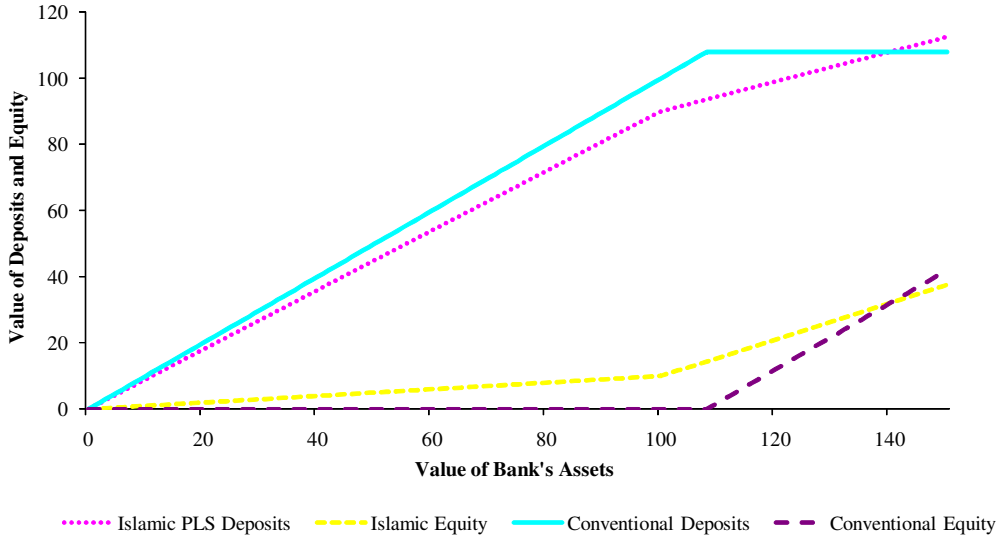
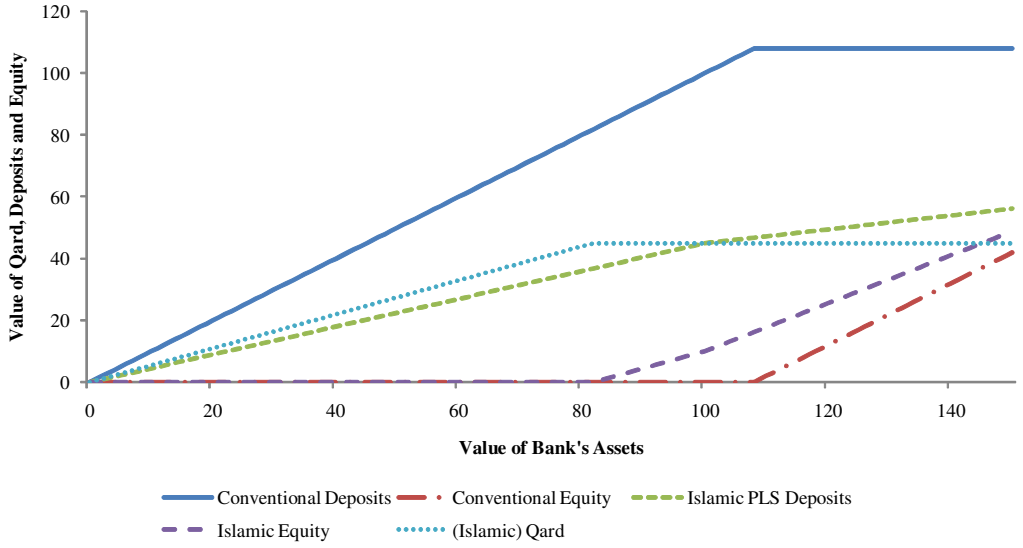


Figure 2.3
This Figure shows the impact of changes in the value of a hypothetical conventional and Islamic bank's assets on the value of PLS deposits, qard and equity of an Islamic bank and deposits and equity of a conventional bank.

Conventional bank is assumed to have deposits of $90, and Equity of $10. Whereas, Islamic bank has PLS deposits of $45, qard of $45 and equity of $10. All $100 available with the banks are invested in a risky asset. The profit sharing ratio between Islamic bank and her PLS depositors is 50-50, qard does not earn any return and its nominal value is guaranteed by the bank. Conventional bank pays a flat guaranteed return of 8% to her depositors.



2.3 Islamic Banking Products

I am not the first to define and describe contracts used in Islamic banking, but my approach is different. In describing the contracts, where necessary, I draw a parallel between Islamic and conventional contracts and highlight features that differentiate Islamic contracts from their conventional counterparts. In doing so, I conjecture regarding the influence of those differentiating features on pricing of the products and likely influence on the behavior of users of the products. I limit myself to describe only those products that are most commonly used by Islamic banks.

2.3.1 Qard:

In Islamic tradition, qard (loan) is considered as a charitable activity, as such it does not carry any interest or excess payment other than the principal amount. Depending on the terms agreed between borrower and lender, qard may be payable on demand or at a specific time. The lender can charge an administrative fee to cover administration costs and may also demand collateral. At the time of returning the loan, the borrower may, and is encouraged to, return more than the principal amount at her own will.

Qard is generally used by Islamic banks to mobilize non-return bearing checking accounts (current accounts). On rare occasions, Islamic banks also lend on qard basis.

Although, current account holders place their deposit with the bank as benevolent loan, but it is straightforward to understand that they do not necessarily do this as an act of charity towards bank, because they can always find more needy persons than a bank. Most probably, they hold current accounts with the bank to be able to use the payment and safekeeping services of bank.

2.3.2 Mudaraba:

Mudaraba can be used both as a mode of financing and as a mode of accepting PLS deposits. Most commonly it is used as a mode of accepting PLS deposits and rarely as a mode of financing. Usmani (2002) defines *mudaraba* as:

> "*This is a kind of partnership where one partner gives money to another for investing in a commercial enterprise. The investment comes from the first partner who is called "Rab-ul-Maal" while the management and work is an exclusive responsibility of the other, who is called "Mudarib" and the profits generated are shared in a predetermined ratio"*

In a *mudaraba*, profits can be shared in any proportion between the *mudarib* (working partner) and *rab-ul-maal* (financier). Expenses incidental to the business are paid by

mudaraba, that is, they are expensed out of the revenues generated by the business before proportioning profits. In the event of a loss, the partners share in losses in the same form in which they made contribution to the *mudaraba*. That is, all financial losses are strictly borne by the financier, unless they are caused by negligence or fraud of the working partner and the working partner incurs a loss of efforts invested in *mudaraba*. The financier has only financial interest in the partnership and cannot interfere in the business activities, unless authorized to do so by the working partner. The liability of financier is limited to her investment. Hence, the legal status of financier in a mudaraba can be compared to limited partner in a conventional partnership.

When working partner in a *mudaraba* is a limited liability company, for example a bank registered as a limited liability company, then all partners enjoy limited liability. In this case the legal status of *mudaraba* is comparable to Limited Liability Limited Partnership.

2.3.2.1 Mudaraba when Working Partner is a Legal Person:

There is a unanimous consensus of jurists that in the event of a loss in *mudaraba*, the financial loss is exclusively borne by the financier, whereas, the working partner incurs loss in the form of lost efforts[5]. This concept has been advanced as fair sharing of losses and is straightforward to understand when working partner is a natural person. However, it is less clear how the working partner will lose efforts, when it is a legal person, for example a bank[6]. It is important to clarify 'who' is the bank/ *mudarib* in this case, what efforts does it exert that will be lost and how a legal person can lose efforts?

---

[5] *Mudarib* or working partner is liable for financial losses only if the losses are incurred by his/her negligence or when he/she ultravires the authority given by the *rab-ul-maal* or financier

[6] Terms and conditions of PLS Account of Al Baraka Bank, Pakistan state: "In the event of loss in business/investments, that may occur without any fault or negligence on part of the Bank, all Investors of the Investment Pool shall share loss on pro rata basis and the *Bank shall loose* (sic) *the share for its effort*.", available at http://albaraka.com.pk/products/terms-cond/terms_conds.pdf

Bank management and employees exert efforts, but they are distinct from the bank and receive salaries for their efforts and do not lose efforts when the bank incurs a loss. Directors on Board of a bank have dual role of investors and agent of shareholders. For agency services, the directors receive a fee and do not lose it if the bank incurs a loss. Directors in their capacity as shareholders (and other shareholders) are investors and do not exert efforts, so they also cannot lose efforts, in the event of a loss. Moreover, unlike *mudarib*, the shareholders seek a return on investment, not a return for offering skills. Bank as a legal person exerts efforts through employees and directors and both of these groups do not lose their efforts when bank incurs losses.

If bank is defined as a combination of and provider of infrastructure including technology and management (including employees) in the form of legal entity bank, then it will deemed to be the responsibility of the bank to pay for the costs incurred in providing these services[7]. In this case, the financier (*rab-ul-maal*) will share in the revenue (not net profit) of the bank before deducting any administrative costs[8]. If there is a loss, then the bank will lose any amount spent on the infrastructure and salaries.

It may be noted that if the above description is correct then *mudaraba* where *mudarib* is a legal person differs from the classical *mudaraba* (where *mudarib* is a natural person). In the former certain expenses (salaries of employees) are borne by *mudarib*, whereas in the later all expenses related to business are borne by the business. The implication of this treatment is that, in classical *mudaraba*, all financial losses are borne by *mudarib*, whereas if the *mudarib* is a legal person then *mudarib* is exposed to financial losses if the business produces zero or negative returns.

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[7] In the same way as a natural person in the role of *mudarib* is responsible for his/her upkeep

[8] Some direct costs, for example auditor's fee, may still be deducted from revenues.

The discussion on the implications of a legal person as *mudarib* has escaped literature; however, in practice Islamic banks appear to follow the modus operendi detailed above. Relevant financial statements suggest that many Islamic banks operating in Pakistan and other countries share revenues[9] (before deducting administrative expenses) with their depositors.

2.3.2.2 Mudaraba, Moral Hazard and Corporate Governance:

There are a couple of related issues concerning *mudaraba*[10] that have gained a lot of attention in literature. These issues are related to presumably high agency costs in *mudaraba*, lack of protection of PLS depositors from moral hazard and corporate governance issues arising out of this (see El-Gamal (2003)). Higher agency costs and asymmetric information are also advanced as the most convincing arguments of the supremacy of interest based lending over profit and loss sharing (Freixas and Rochet (2008)).

When PLS deposits in an Islamic bank are based on *mudaraba*, then PLS depositors are legally not creditors of the bank, and as such they are not covered by the protection of being the primary claimants, that is generally available to creditors. PLS depositors are residual claimants as they share in profit and loss of the bank but unlike shareholders they cannot appoint a director on the board of bank, hence they do not have any say in the affairs of the bank. Mudawi (1985), Khan (1986), Sadr and Iqbal (2001), EI-Din and Ibrahim (1991) and Khan (1989) also express concerns about moral hazard in PLS schemes.

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[9] Terms and conditions of PLS deposits use varying terminology like income, profit, gross profit, gross income without defining how that profit is calculated.

[10] Islamic banks use *Mudaraba* both on asset and liability side. However, more commonly *mudaraba* is used to offer return earning saving accounts and term deposits (collectively PLS deposits), therefore, mostly reference is made to *mudaraba* as it applies to the relationship between PLS depositors and bank.

Contract theory suggests that these concerns are misplaced and surface from ignoring an important feature of *mudaraba* contract in general and *mudaraba* based deposits in particular. That is, unlike shares, deposits are redeemable[11]. Fama and Jensen (1983) contend that this feature equips the principals (depositors) with the ability to independently deprive the management of controlling their assets. Principals with such ability are often not interested in appointing a director on the board, because it is irrelevant for them. To exercise similar power, shareholders need to rely on a sufficiently liquid stock market, and/or a market for takeovers, and/or coordination and consent of other shareholders, and reliance on Board of Directors to whom they delegate their powers.

Moreover, controlling agency problems is important when interests of principal and agent are not aligned. Under *mudaraba*, instead of a fixed remuneration, the principal(depositor) shares profit with the agent (bank), therefore, the interests of Islamic bank/shareholders and depositors are more aligned as compared to the interests of a conventional bank and its depositors.

In Figures 2.2 and 2.3, I graphically show that the interests of depositors and shareholders/bank are more aligned in Islamic banks than in conventional banks.

2.3.3 Murabaha or Bai Mu'ajjal:

Bai Mua'jjal means a credit sale or sale with deferred payment. Islamic banks routinely use credit sales as a mode of financing by purchasing an asset at spot price from suppliers and selling the same on credit to their customer (I will refer these customers as borrower

[11] In general both saving accounts and term deposits are redeemable. For term deposits, the depositors may have to forego part or all of accrued/ expected profit.

in the rest of the chapter) at a marked up price. In doing so, they usually appoint the borrower as their agent to purchase the underlying asset. Because of her involvement in purchase of asset from supplier, the borrower knows the profit margin of the bank. A sale in which the seller discloses the purchase price and profit margin is called *murabaha* in Arabic, therefore, such marked up credit sales by Islamic banks are commonly referred to as *murabaha*.

Murabaha is the most extensively used mode of financing by Islamic banks. Interestingly, it also draws intense criticism from practitioners and academicians alike. The criticism on *murabaha* is based on its resemblance with interest-based financing and its lack of ability to restore the economic order that Islamic economists promise viz a viz prosperity, justice, equity and the like. However, as discussed earlier in introduction, the claims of theological superiority of PLS over mark-up are mainly founded on the personal opinions of jurists and economists.

Most jurists sanction the permissibility of mark-up based financing, but share the frustration of many economists over heavy reliance of Islamic banks on *murabaha*. Often, it is *murabaha* that prompts scholars to refer Islamic banking as 'functionally indistinguishable from conventional banking' (Khan (2010)), 'net result does not differ much from interest-based transactions' (Usmani (1998)), 'a more realistic approach would be to conclude that Islamic products differ from their conventional counterparts in the same manner that Kosher water bottles differ from most other bottled water: certification by certain religious figures' (El-Gamal (2003)) or out rightly call for its elimination, 'I would prefer that *Bai' Mu'ajjal* is removed from the list of permissible methods altogether' (Siddiqi (1988)).

There are subtle differences in an interest-based contract and *murabaha* contract that are often ignored in comparing these two contracts. However, these differences are

economically meaningful as they can change the nature of the contracts and induce the contracting parties to take different actions under the two contracts.

One distinguishing feature of *murabaha* is that although at the time of contract any price can be fixed for the underlying asset yet, once the contract is made, price cannot be changed anymore. Since a *murabaha* contract creates a debt, therefore, subsequent change in price (of debt) constitutes *riba*. This has two repercussions; firstly, if after taking say a five-year financing under *murabaha* contract the borrower wants to prepay the whole amount after one year (hoping to refinance it at cheaper rate), she will have to payback originally negotiated price that includes the markup for entire five years, I show this graphically in Figure 2,4.

In *murabaha* financing, the borrower does not have the option of prepayment and refinancing. If this option is not priced in the value of *murabaha* contract and if *murabaha* is for medium to long term then Islamic banks may want to give *murabaha* financing to those borrowers who have higher chances of renegotiating favorable terms in future, for example, new but healthy borrowers who do not have negotiating power now because they do not have an established credit history but are expected to perform well and able to negotiate more favorable terms later. One the other hand, the borrowers for whom this option is more valuable would favor a variable rate product over *murabaha*. What happens in reality is an empirical question that I do not address here.

The other implication of the inability to change price in a *murabaha* contract is that, the bank cannot charge more if the loan has to be renegotiated to say extend the repayment period. If Islamic bank extends the maturity of a *murabaha* contract then this would effectively lower the markup rate on the financing. In contrast to this, in an interest-based loan, the bank can extend the maturity of loan and still earn same (or more) interest rate. This is depicted in Figure 2.5.

A corollary of this prohibition of change in the price of *murabaha* contract is that in the event of delinquency, in principle, bank cannot charge any penalty to the borrower. To contain moral hazard on part of borrower, Islamic banks are allowed to charge penalties on delinquencies, but the bank must give away the penalties that it collects in charity. This may induce Islamic banks to better screen borrowers to avoid providing free credit to the delinquent borrowers when the due amounts are delayed or unpaid. On the other hand, when there is a need and a choice, it may induce borrowers to delay payments for *murabaha* / Islamic financing rather than conventional loans hoping that the Islamic bank would be more willing to waive penalties to leave the borrower in more credit worthy condition to be able to recover at the least the contracted amount.

Figure 2.4

The Figure displays the present value of a murabaha contract and a loan contract with nominal value of 100 and initial interest/markup rate of 10% fixed for the entire duration of loan/murabaha. The red line show the present value of the above murabaha when immediately after disbursement the borrower has the opportunity to renegotiate the contract at 5%, but cannot take it because of the lack of prepayment option in murabaha. I assume a flat yield curve and assume that the discount rate is the same rate at which

The dashed line shows the present value of a conventional loan in similar situation, where the borrower avails the renegotiation opportunity.

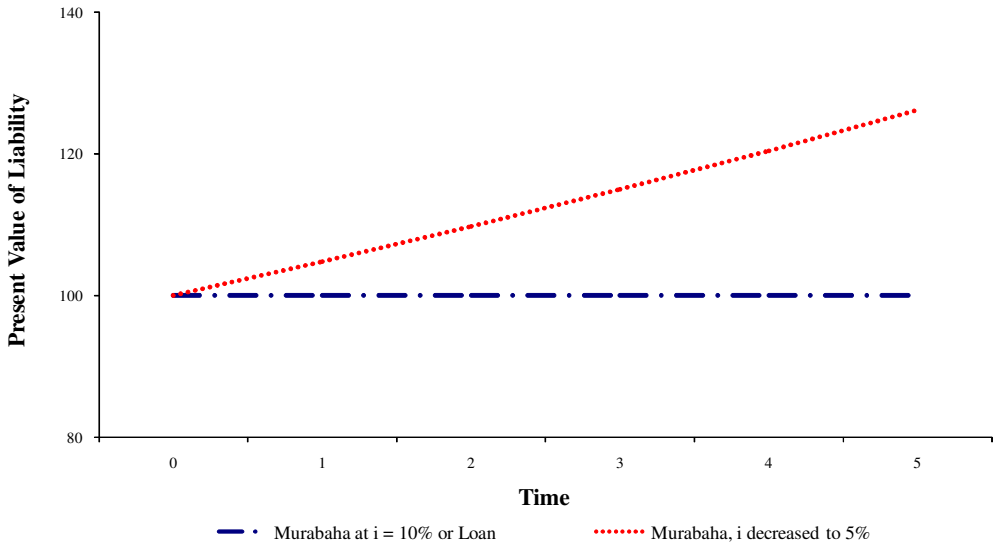
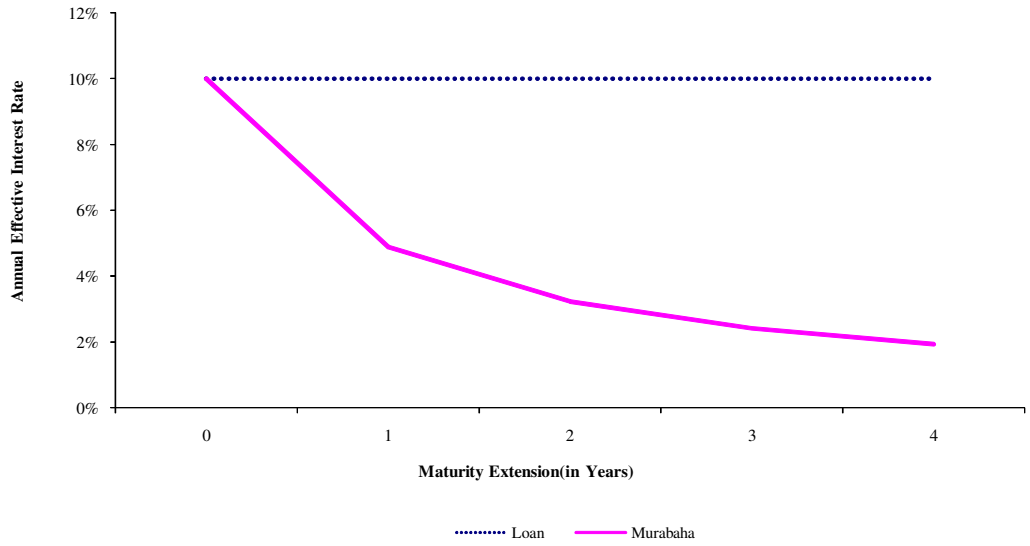


Figure 2.5
The Figure shows the impact of extension of maturity of a murabaha and conventional loan on its yield. I assume that the for conventional loan, in the event of extension, the bank charges same interest rate for the extension period as it is charging before extension. In case of murabaha, the total amount payable to the bank cannot be changed if the bank agrees to extend the maturity.



2.3.3.1 Pricing of Murabaha Contract:

Suppose that delinquency does not exist and in the absence of delinquency, the price of Loan is L and the value of the option to prepay the loan is O, then fair price of *Murabaha* contract (M) should be:

$$M = L - O$$

Now assume that the probability of delinquency is non-zero with expected loss of E(P) resulting from the delinquency, also assume that in the event of delinquency, the bank can charge a late payment fee P such that expected value of P is also E(P) and price of Loan with delinquency will be:

$$L^* = L$$

Further assume that the expected loss from delinquency in *murabaha* financing is also E(P), and like conventional bank, Islamic bank can charge a penalty P with expected

value E(P), but the Islamic bank must give this penalty in charity. In this case the value of *murabaha* (M*) for the Islamic bank is

$$M^* = L^* - E(P)$$

Whereas the cost of *murabaha* for customer of Islamic bank (M**) is:

$$M^{**} = M^* + E(P)$$

In the presence of delinquency risk, in *murabaha* transactions, dead weight costs[12] exist in the form of penalty that is a cost for the borrower but not revenue for the bank. Depending on their respective elasticity of the demand for religiosity the bank (shareholder), depositors and borrower must share this cost as a piety premium. Shareholders can fulfill their demand for religious investment by investing in non-bank shares, so primarily this cost must be shared between depositors and borrowers, so the price of *murabaha* (M^d) in the presence of delinquency will be:

$$L - O > M^d > L - O + E(P)$$

2.3.4 Ijarah and Ijarah wa' Iqtina:

Ijarah is a rental contract similar to a conventional lease. In *ijarah*, the *ajir* (lessor) allows the *mustajir* (lessee) to use an asset in return for rentals. During the period of lease, the lessor remains the owner of the asset and all risks and rewards of the ownership accrue to her; whereas, the lessee enjoys the risks and benefits of the user of leased asset. If the leased assets are damaged by accident then lessor bears the loss, conversely lessor is responsible for insurance. If the assets are damaged by the negligence of the lessee or if a third party incurs a loss from the use of assets then lessee is responsible for such losses, conversely lessee is responsible for third party liability insurance.

[12] Note that this is a dead weight cost for bank and customer not for society.

Leased asset must be non-consumable (depreciation is disregarded). Rentals may vary over time and lease agreement can be terminated with the mutual consent of lessee and lessor or it can be terminated by lessor if the lessee contravenes any terms of lease. A key difference between a conventional lease and Islamic lease (*ijarah*) is that in the latter, the lessee does not need to pay rentals if the asset becomes unusable due to accident or change in law. For example, if a lessor leases deep water drilling equipment or nuclear power plants under *ijarah* and subsequently, government restricts deep water drilling or nuclear power plants rendering the equipment unusable then the lessee is no more liable to pay the rentals.

Pricing *ijarah* contract, given the price of a conventional lease contract, is straightforward. The price of *ijarah* is the price of a conventional lease plus appropriate premium to insure the lessor's ownership related risks.

Ijarah wa'Iqtina is similar to an *ijarah* contract as described above. The difference between the two is that in the former, at the termination of lease contract, the lessee becomes owner of the asset either for free (when lessor gifts the asset to the lessee) or after paying a pre-agreed price (Baele, Farooq et al. (2010)). Apart from the difference that, insurance is the responsibility of lessor, *ijarah wa'iqtina* is comparable to a conventional financial lease.

2.3.5 Musharakah:

Musharakah is a relationship between two parties or more, who contribute capital to a business, and share the profits and losses. All providers of capital are entitled to participate in management, but not necessarily required to do so. The profit is distributed among the partners in pre-agreed ratios, while the loss is borne by each partner strictly in proportion to respective capital contributions.

Bank and customer enter into a *musharakah* agreement by investing a certain sum of capital in the business for a specified period of time so by definition it has a limited life. Step by step procedure involved in using *musharakah* as a mode of financing is detailed in Chapter 3 and Baele, Farooq et al. (2010). For more discussion on the rules of *musharakah* please refer to Usmani (1998).

2.3.6 Diminishing Musharakah:

In a *diminishing* musharakah contract, a bank and her client participate in the joint ownership of a durable asset (property or equipment). The customer leases the asset and the bank and customer share the rentals according to their respective ownership in the underlying asset. The customer also undertakes to purchase parts of the assets over a period of time at agreed upon dates and price. The ownership of the asset thus gradually transfers from the bank to the customer. Please refer to Baele, Farooq et al. (2010) for detailed steps involved in *diminishing musharakah* transaction.

In *diminishing musharakah* contracts, banks normally do not charge market rent, neither do they sell their share in underlying property at the market price. Instead in practice, to ensure market returns, banks index the rent of underlying property to a benchmark market interest rate, they also fix the sale price of their share in property to match the returns on conventional mortgage. It will be an interesting exercise to use historical housing rent and price data to compare the risk and returns of a *diminishing musharakah* contract assuming that the bank charges market rents and sells her shares at market price with the risk and return of *diminishing musharakah* as it is practiced.

2.4 Review of Empirical Literature:

2.4.1 Efficiency:

Efficiency of the Islamic banking has been a concern for scholars, because several products used in Islamic financing are considered as inefficient by their very nature like PLS products or because of using superfluous contracts to engineer products similar to conventional loans, for example *murabaha*. El-Gamal and Inanoglu (2005) study bank efficiency in Turkey both in terms of cost-function frontier analyses and labor efficiency analysis. Using 11 years of data from 1990-2000, they find that Islamic banks in Turkey are relatively efficient in terms of extension of credit as well as their hiring practices. El-Gamal and Inanoglu (2005) do not interpret the economic relevance of the differences in efficiency that they observe, however, they contend that Islamic banks are more efficient owing to lower ratio of non-performing loans. An interesting finding in their paper is that, Islamic banks utilize the more efficient hiring techonology of foreign banks, however, from cost frontier point of view they look similar to domestic private banks that are more efficient at this front. These findings are not surprising, as in Turkey most of the Islamic banks are foreign owned but unlike foreign owned conventional banks, that rely on investment in government bonds, Islamic banks engage in credit operations like domestic conventional banks.

Al-Deehani, Abdel Karim et al. (1999) show that due to *mudaraba* based deposits, Islamic banks can increase their market value without increasing risks. Their simulations show that a 10% increase in the Investment Account financing results in a first year increase of 1.6% in market value of the banks. Other empirical studies also suggest that Islamic banks are not necessarily inefficient (see Bashir (1999), Iqbal (2001); Agaoglu (1994), Samad (1999)).

Contrary to this Moktar, Abdullah et al. (2006) find that from 1997 to 2003, although technical and cost efficiency of Islamic Banks in Malaysia has increased over time but Islamic banks still lag behind their conventional counterparts. They also note that full-fledged Islamic banks are relatively more efficient than Islamic windows of conventional banks and the technical and cost efficiency of full-fledged Islamic banks is not different from those of conventional commercial banks. Average cost efficiency of conventional and Islamic banks in their sample is 87.6% and 86.0% respectively. Further breakup of these figures reveals interesting information, the average cost efficiency of conventional commercial banks, full-fledged Islamic banks and Islamic branches of conventional commercial banks is 87.7%, 87.7% and 85.4% respectively in their sample. This suggests that full-fledged Islamic and conventional commercial banks are equally cost efficient, however, the Islamic braches of conventional commercial banks are less cost efficient and drag the overall results of Islamic banks. It is imperative to note that the efficiency computations for Islamic branches must be interpreted with caution because the intra-bank transactions between the Islamic branches and the parent commercial bank may not necessarily be at arm's length. If this is true then the '*actual*' cost efficiency of Islamic branches may in fact be higher (or lower). Their results show similar results for the technical efficiency of conventional and Islamic banks.

Study by Sufian (2006), explains the difference in the efficiency in the Malaysian Islamic banking sector. Using Data Envelopment Analysis on Malaysian Islamic banking data from 2001-2004, he finds that domestic Islamic banks are more efficient than foreign Islamic banks, but scale inefficiency dominates pure technical inefficiency within the Malaysian Islamic banking sector. He estimates that the average pure technical efficiency of foreign and domestic Islamic banks was 90.7% and 94.8% respectively in his sample, whereas the average scale efficiencies for these groups were 75.2% and 91.0%

respectively. This suggests that Islamic banks can gain some efficiency by changing scale of their operations, if possible.

There are big cross-country differences in the efficiency of Islamic banks. In a cross-country study covering 14 countries from 1999-2001, Brown (2003) finds that the most efficient Islamic banks are consistently found in Iran, Brunei and Yemen (fully efficient). Malaysian banks were fully cost efficient in 1999 and 2000 and the least cost efficient countries are Indonesia and Sudan (38% - 68% efficiency). He suggests that the different operating environments and financial reporting practices in each country might be driving these results.

In a recent study employing data from 10 countries over the period of 1996-2002, Abdul-Majid, Saal et al. (2010), find that Islamic banks are technically inefficient as compared to their conventional counterparts. On average, Islamic banks operate at 41.8% below their potential output levels as compared to conventional banks that operate at 16.3% below their potential. This substantially low level of efficiency of Islamic banks is mainly driven by Sudan and Yemen as Islamic banks in these countries operate at extremely low efficiency levels. Furthermore, the efficiency of Islamic banks varies significantly across countries. They find the Islamic banks in Sudan and Yemen to be least efficient and those in Bahrain and Bangladesh to be the most efficient in 10 countries that they analyze. It should be noted that this study classifies the Islamic banking in Yemen as the least efficient according to the estimates of Brown (2003), banks in Yemen were fully efficient. Contrary to the study of Abdul-Majid, Saal et al. (2010), using data from 2001-2006 encompassing 21 countries, Bader, Mohamad et al. (2008) do not find any significant difference between the overall efficiency of conventional and Islamic banks. The differences in the results of these studies can be attributed to different efficiency measures, samples and periods

In a broader study spanning 141 countries and covering period of 1995-2007, Beck, Demirgüç-Kunt et al. (2010) find Islamic banks to be more efficient in the larger sample comprising all countries, but less efficient than conventional banks in countries where Islamic and conventional banks co-exist. They report 6.4 % lower cost-income ratio and 0.9 % lower overhead costs for Islamic banks as compared to their conventional counterparts. These differences are economically meaningful compared to the mean value of 62% for cost-income ratio and 3.5% for overhead costs. However, in countries where both Islamic and conventional banks co-exist, Islamic banks have a 3.5 percentage point higher cost-income ratio and 0.3 percentage points more overhead costs than conventional banks. The lesser efficiency of Islamic banks as compared to the conventional banks where both banks coexist might be related to the presence of relatively younger Islamic banks in those countries, with higher establishment related costs in the initial years and a need to spend more to gain traction and compete with the relatively mature conventional banks with established brands, clientele and systems. Another reason for this difference could be relative strength of conventional banks to harness efficiency from economies of scale and scope that might not be available to relatively younger Islamic banks.

The literature on efficiency does not provide any conclusive evidence of the absolute superiority of Islamic or conventional banks in terms of their efficiency. The results are overall mixed, with Islamic banks more efficient in some forms or countries and less in others. This suggests that, both Islamic and conventional banks have potential to gain efficiency in different regions or by employing certain structures.

2.4.2 Performance:

It is a long held idea that profit and loss sharing system is inherently more stable and will perform better than an interest based system. Using Bahrain Islamic Bank (BIB) as a case,

Turen (1996) shows that during the period of analysis this bank offered a higher risk adjusted return as compared to commercial banks operating in Bahrain and argues that the profit sharing concept of Islamic banking can achieve a higher profitability and lower risk than conventional commercial banks. He reports average gross income to risk weighted assets ratio of 3.85% and 7.88% for conventional banks and BIB respectively during 1980's.

Al-Deehani, Abdel Karim et al. (1999) argue that because of the profit sharing provisions with the depositors, Islamic bank can to increase their market value and return on equity without incurring any additional financial risk. Using a sample of 12 Islamic banks they provide empirical evidence in support of their theoretical argument. Their simulations show that a 10% increase in the Investment Account financing results in first year increase of 1.6% in market value of the banks.

2.4.3 Financial Stability:

The proponents of Islamic finance argue that financial intermediation based on Islamic principles would bring in greater stability in domestic economy, financial markets and even in international economy. (Siddiqi (2006); Zaher and Hassan (2001); Nigel (1998); El-Gamal (2000)). There is, however, a dearth of studies to empirically test this hypothesis.

Employing Z-scores to test the relative strength of banks in 18 countries from 1993-2004, Čihák and Hesse (2010) find significant differences in the z-scores of conventional and Islamic banks. They also report differences in strength of small and large Islamic banks, they find that small Islamic banks are financially stronger than small and large commercial banks, whereas, large Islamic banks are weaker than large commercial banks. The z-scores calculated by them for large conventional and Islamic banks are 19.5 and

12.9, whereas, z-scores for small conventional and Islamic banks are 17.2 and 25.0 respectively. They attribute their findings to the challenges of credit risk management, in large Islamic banks, related to PLS based financing. However, PLS based financing form a very small part of the overall credit portfolio of Islamic banks and is unlikely to drive this result.

In a sample of 22 countries covering the period from 2001 till 2008, Abedifar, Tarazi et al. (2010) also find that small Islamic banks are safer relative to small conventional banks with respect to credit risk, but this does not hold for large Islamic and conventional banks. In their estimates, small Islamic banks have 2.6% lower infection rate as compared to small conventional banks. They argue that a possible explanation for this finding is that small Islamic banks might be attracting more Islamic oriented and risk averse customers with lower propensity to default.

In a broader study covering 141 countries over the period 1995-2007, Beck, Demirgüç-Kunt et al. (2010) note that Islamic banks are better capitalized with average capital-asset ratio 2.5% higher than conventional banks. This difference is economically large given mean capital-asset ratio of 10.8% in the sample. However, despite better capitalization, they do not find significant difference between the stability of Islamic and conventional banks.

Using loan level data from Pakistan covering the period from 2006 to 2008, Baele, Farooq et al. (2010) find that as compared to conventional loans, on average Islamic loans are less likely to default. They show robust evidence that the default rate on Islamic loans is less than half of the default rate on conventional loans.

The literature thus suggest that the structure of banking sector and the size and organization of Islamic banks may influence the health of Islamic banks with consistent evidence that small Islamic banks are stronger than small conventional banks. This does

not hold for large Islamic and conventional bank, where large conventional banks are equally or more stable than large Islamic banks.

2.4.4 Islamic Banking Deposits and Monetary Policy Shocks:

Proponents of interest-free banking purport that interest-free economies are destined to have relatively more monetary stability than interest based economies because interest-free system ties the credit to assets that reduce bubble formation and speculation.

There is little empirical research on the impact of monetary policy shocks on the deposits of Islamic banks viz-a-viz conventional banks. Some survey studies suggest that deposits in Islamic banks may be more resilient to monetary policy shocks (Khan (2010), and Gerrard and Cunningham (1997)). Gerrard and Cunningham (1997) document that over 60% of the Muslim customers of Islamic banks declared that they will not withdraw deposit even if the bank does not pay any return. This is suggestive of relative insensitivity of the depositors of Islamic banks to the changes in interest/return rate and can have important implications for the conduct and transmission of monetary policy. Contrary to these results, Yusof, Abd. Majid et al. (2009) provide some empirical evidence from Malaysia to show that balance sheets of Islamic banks are more sensitive to monetary policy changes as compared to those of conventional banks. This suggests that the impact of monetary policy shocks can be more destabilizing for Islamic banks as compared to their conventional counterparts.

2.4.5 Islamic Bank Customers:

Theologically, conformity to the prohibition of interest is not a matter of choice for Muslims, however, practically they can choose between Islamic and conventional banks. Traditionally analysts have argued that pious Muslims are the primary users of Islamic financial products (Pepinsky (2010)). What motivates customers to bank with Islamic

banks or what type of customers an Islamic bank chooses is an empirical question, therefore, I turn to the empirical evidence available in literature.

Gerrard and Cunningham (1997)'s study suggests that religious motivations may govern the choice of bank or staying with an Islamic bank in turbulent times. In their study, in Singapore, in response to a survey question, 62.1 per cent of Muslims said that they would keep their deposits with the Islamic banks if their bank did not make sufficient profits to give a return on deposits. As compared to this, 66.5 per cent of non-Muslims said that they would withdraw their deposits in such a case.

Pepinsky (2010) suggests that class, not piety, is a determinant of the use of Islamic banking in Indonesia. He recognizes that if banking products (deposits) are just more expensive than conventional banking products then a correlation between incomes and banking choice only suggests that sensitivity to price is a declining function of income. He rejects that this is the case quoting that the returns on conventional and Islamic deposits in Indonesia are same.

However, due to the profit and loss sharing provisions, if Islamic deposits are marginally more risky than conventional deposits, and returns on both types of deposits are same then it follows that risk-adjusted returns on Islamic deposits are lower than risk-adjusted returns on conventional deposits. If this is correct, then the inferences drawn by Pepinsky (2010) warrant a revisit.

Using a survey of Pakistani depositors, Khan and Khanna (2010) find that indeed besides religiosity, wealth also matters in banking with an Islamic bank. Khan (2010) finds that growth rates of deposits of Islamic banks are substantially higher than that of conventional banks, average about 13.5% during the sample period compared to 1-2% for other banks, and that this higher growth rate is resilient to financial crisis.

Regarding bank choice in commercial setting, Ongena and Şendeniz-Yüncü (2011) find that Islamic banks deal with young, multiple-bank, industry-focused and transparent firms.

These papers suggest that there can be rational or economic reasons for people and firms to choose Islamic banks, however, religiosity does influence this choice.

2.4.6 Islamic Banking and Judicial Uncertainty:

Islamic contracts need to conform to two laws, the law of the land and the *Shari'ah.* Because of this additional requirement of compliance and because *Shari'ah* is considered to be indefinite and open to interpretation, concerns has been raised regarding additional judicial risk in Islamic financial contracts (see, for example Jobst (2007)). To unscramble this issue further, it is important to distinguish between the cases where the contracts are entered into so called Islamic countries or secular countries and if this risk arises out of the cross country differences in legal opinions.

In secular countries, the law of the land is not subservient to *Shari'ah*. In case of any conflict the law of the land prevails, therefore, Islamic financial contracts entered into secular countries have as much judicial uncertainty as any other secular financial contracts as both are governed by the same laws and statues.

Islamic laws may be interpreted differently in different countries or by the adherents of different schools of thoughts, but this holds for secular laws as well. The set of (secular) laws and their specific interpretation and implementation may differ substantially across different countries, therefore, the cross country judicial uncertainty surrounding Islamic (financial) contracts equally applies to secular contracts as well.

It is important to highlight that uncertainty regarding the interpretation of law is not specific to Islamic laws, Rosenfeld (1998) notes *"So long as laws must be applied and legal disputes adjudicated, legal interpretation cannot be avoided"*. Moreover, within individual countries the school of thought of the majority of the population is considered by courts to decide the legal disputes and as Yefet (2009) notes, if there are competing interpretations then the interpretation that is compatible with the constitution is applied . It has been shown in other contexts that, courts consistently interpret the Islamic laws and then consistently use that interpretation as a precedent for subsequent decisions (Yefet (2009)).

In Islamic countries (where *Shari'ah* is declared as the supreme law), secular financial contracts may be subject to more judicial uncertainty as either the plaintiff, the defendant or the court may invoke *Shari'ah,* this is documented by Yefet (2009) in a different context.

This suggests that Islamic financial contracts may not have a higher judicial risk than their conventional counterparts.

2.5 Conclusions

Islamic banking is a promising and burgeoning field, but most of the literature has so far been focused on theological or economic justification of the notion, theoretical models, and practitioner's literature with little attention to empirical evidence. Most of the empirical work is devoted to comparing the efficiency of Islamic banking with conventional banking. There is specially a dearth of empirical literature concerning product pricing, significance of certain provisions of Islamic contracts on the behavior of contracting parties, resilience of Islamic banking to monetary policy shocks or its insulation from contagion affecting other banks. More empirical literature can further our

understanding of Islamic banking, and can give useful insights that can be used in conventional banking as well. I hope to see more empirical literature in the field of Islamic banking related to these issues.

3

Of Religion and Redemption: Evidence from Default on Islamic Loans[13]

3.1 Introduction

Islamic banking is one of the fastest growing parts of the financial sector. Doubled in size since 2006 and already accounting for $900 billion or more than 1% of the global banking market (*Financial Times*, May 12, 2011), "the global potential of the Islamic banking market is conservatively estimated at $4,000 billion, according to Moody's Investor Service" (*Financial Times*, July 8, 2008). The financial crisis may have spurred its growth and potential market share even further, as observers claim the "principles based on religious law insulate the industry from the worst of the financial

[13] This chapter is based on Baele, Farooq et al. (2010). The authors acknowledge the data support from State Bank of Pakistan, however, all views expressed here are those of authors and do not necessarily represent the views of State Bank of Pakistan or its subsidiaries

crisis" (*Washington Post*, October 31, 2008; see also the *International Monetary Fund* report by Hasan and Dridi (2010)).

Yet despite the fast growth of Islamic banking and the imperative claims made about the built-in protection against excessive risk-taking by financial institutions, no research (we are aware of) so far has investigated the default rate of individual conventional versus Islamic loans. This lack of evidence should not come as a surprise, because the identification challenges, and corresponding data requirements, faced by such an analysis are steep. Borrowers seeking Islamic financing and banks granting it may differ from their conventional counterparts in many observable and unobservable characteristics. Whether therefore the difference in credit risk in conventional and Islamic financing is mainly due to compliance with the principles of Islamic law (the *Shari'ah*) *per se*, or is due to borrower, loan contract and/or bank characteristics that are independent of any Islamic rulings remains an open question we aim to address in this chapter.

The data set we employ covers all business loans that were outstanding in Pakistan during the period 2006:4 to 2008:12. The Credit Information Bureau (CIB) database, that we use, is maintained by the Consumer Protection Department of the State Bank of Pakistan and is also analyzed in Khwaja and Mian (2005), Mian (2006), Khwaja and Mian (2008), and Zia (2008) for example. The country and sample period provide a unique setting to analyze the credit risk in Islamic loans.[14]

[14] We henceforth employ the term "Islamic loan", for ease of writing and in accordance with practice of the Credit Information Bureau (CIB) of the State Bank of Pakistan. The CIB maintains uniform records on conventional and "Islamic loans" (and even imputes an implied interest rate for the latter category). As we review briefly later "Islamic loans" involve no interest payments and almost always consist of multiple underlying contracts. For these and various other reasons scholars are often hesitant to label many of the Islamic financial products we will study as "loans" (Kuran (2004)) or even as "Islamic" (see the discussion in Pepinsky (2010) and Khan and Khanna (2010) for example).

Pakistan may be one of the few countries in the world where both well-developed conventional and Islamic banking sectors have co-existed for a considerable period of time.[15] Though the characteristics of borrowers, loan contracts and banks may differ between conventional and Islamic loans, their co-existence in Pakistan offers a unique opportunity to assess the effect of religion on the loan default rate. The majority of Islamic loans granted in Pakistan are simple and standard equivalents to conventional loans, and therefore comparable to these conventional loans and to similar Islamic loans in other countries. Quite a few firms and banks repeatedly and concurrently engage in both conventional and Islamic type financing providing unique opportunities for advanced empirical identification. During the sample period loans continued to be first liberally granted and then increasingly started to default.

Estimating a variety of empirical models, we find robust evidence that Islamic loans are less likely to default. This effect is not only statistically significant, but also economically relevant. The hazard rate on Islamic loans (in various duration models) is on average less than half the hazard rate on conventional loans. For the same borrower taking both conventional and Islamic loans from the same bank, the hazard rate on Islamic loans drops to one fifth the hazard rate on conventional loans. These findings hold in a variety of specifications that contain pertinent combinations of borrower, loan contract and bank characteristics, and year*month, borrower, bank and borrower*bank fixed effects.

The elimination of interest in all its forms or *Riba* in Islamic banking, and the resultant structuring of Islamic loans into, among others, deferred-sale and lease-like contracts,

[15] Pakistan is the second most populous Muslim country in the world (behind Indonesia). It has 185 million inhabitants, of which 95 percent are Muslim (Source: *CIA Factbook*). It shares a long history with Bangladesh and India. These countries combined account for one third of all Muslims in the world.

may provide only a partial explanation for this robust finding. We cannot exclude the possibility that borrowers may also feel a more acute conflict with their individual religious beliefs or those of their fellow believers when defaulting on an Islamic loan (Iannaccone (1998) and Guiso, Sapienza et al. (2006)). Suggestive on this account is our finding that Islamic loans are less likely to default during Ramadan and in big cities – where family and other social networks may be weaker and the distinction between religious and other political parties may be more acute – if the share of votes to religious-political parties increases.

Our study aims, therefore, to contribute to a wider literature (Barro and McCleary (2006)) that investigates how religion helps to explain differences in economic growth across countries (Barro and McCleary (2003)), former colonies (Grier (1997)), regions (Landes (1999)), and early European cities (Dudley and Blum (2001)), and how religion may unidirectionally determine economic development (Barros, Berglof et al. (2005), Barro and McCleary (2006)), through its potential impact on investor protection (Stulz and Williamson (2003)), economic attitude (Guiso, Sapienza et al. (2003)), entrepreneurship (Audretsch, Bönte et al. (2007)), human capital formation (Becker and Wößmann (2009)), occupational organization (Richardson and McBride (2009)), work ethic (Spenkuch (2011)), and/or risk aversion (Hilary and Hui (2010)).

The rest of the chapter proceeds as follows. Section I explains the basic tenets of Islamic banking and their relevance for loan default. Section II introduces the data, our identification strategy, and duration models. Section III discusses the empirical results. Section IV concludes.

3.2 Islamic Banking and Loan Default

3.2.1 Islamic Banking

Islamic Banking refers to a system of banking or banking practices that is consistent, both in objectives and operations, with the *Shari'ah*. The main principles are either directly based on the *Qur'an* and the sayings and actions of the prophet *Mohammed*, or on a growing body of Islamic jurisprudence that is being developed by Islamic scholars. The key distinguishing feature of Islamic banking is the prohibition of interest (*riba*):[16] Islamic banks are not allowed to offer a fixed rate of return on deposits and are not allowed to charge interest on loans, or any positive, fixed, predetermined rate of return that is guaranteed regardless of the performance of the investment.

Ideal modes of Islamic financing are based on the profit-and-loss sharing (PLS) paradigm (we provide details on the different types of Islamic financing in Appendix 3-A). Examples include *Musharakah* (partnership where all partners invest both money and expertise) and *Mudarabah* (partnership with some partners investing only money and others only their skills/labor). The ex-ante fixed rate of return common in conventional loan products is replaced by a return that is uncertain and dependent on the borrowing company's realized profits, which make these two financing structures compatible with *Shari'ah* principles. Notice that both *Musharakah* and *Mudarabah* bear very little resemblance with interest-bearing contracts in conventional banking, which would make it problematic to compare their respective default rates. In practice,

[16] See El-Gamal (2001) for a detailed discussion of riba. Other important principles include the prohibition to: (i) invest in sinful activities (such as businesses involving alcohol, firearms, pork products, or adult entertainment); (ii) unequal exchange of money for debt (without an underlying real asset); (iii) speculate, bet, or gamble; (iv) trade the same object between the buyer and seller; and (v) engage in contracts with preventable uncertainty (see e.g. Jobst (2007)).

however, PLS contracts only constitute a small share of the market for Islamic loans products. In fact, in our sample, less than 3 percent of all Islamic loans are based on the PLS principle.[17]

Instead, Islamic banks have developed lending structures that, while being *Shari'ah* compliant, largely mimic the characteristics of conventional lending products. In a *Murabahah* contract (similar to a term loan), the bank first purchases a real asset from a supplier, and consequently sells it in a different contract at a marked-up price to the borrower. Interest rate payments are implicit as the borrower pays the markup price in installments over a period of time or in lump sum at maturity of the contract. This contract is permissible because trade in general is allowed and also the bank is technically exposed to risk between the moment it takes legal possession of the underlying asset (first contract) and the moment it transfers the asset to the borrower (second contract), even if in practice this moment is often very short.

Similarly, Islamic leasing products have been developed. In case of *Ijarah*, the bank buys an asset for a customer and then leases it to the customer for a certain period at a fixed rental charge. Islamic law allows rent to be charged because the customer enjoys the usufruct of the good while the bank bears the risk of ownership. *Ijarah wa'Iqtina* is similar to an Ijarah contract except that it allows for the possibility that the customer becomes owner of the good at the end of the lease contract, either for free (gift) or at a pre-agreed price. Finally, in a *diminishing Musharakah* contract, a financier and his

[17] Often quoted reasons include agency problems, lack of well-defined property laws, the restrictive role of shareholders in management, or a disadvantageous tax treatment. Many banks, facing competition from conventional banks, may consider PLS contracts as being too risky. See also Bashir, Darrat et al. (1993) and Dar and Presley (2000), among others. The low share of PLS lending contracts is not specific to Pakistan. Chong and Liu (2009), for instance, find that only 0.5 percent of Islamic loans in Malaysia adopt the PLS paradigm.

client participate either in the joint ownership of a property or an equipment. What is different, however, is that the share of the financier is divided into a number of units, which at pre-agreed moments in time will be purchased by the client. Each period, the client's share increases until all units are bought and he fully owns the property or asset. Rent is paid to the financier according to his remaining share in the project.

3.2.2 Default on Conventional and Islamic Loans

The previous section showed that the most popular Islamic lending products are *functionally identical* to conventional loan products.[18] Does this mean that we should also expect their default rates to be similar? Clearly, Islamic loans are structured differently and are governed by different contracts than conventional loans. Moreover, there can be different motivations to prefer one form of banking over the other. For example borrowers may choose conventional over Islamic banks because of easy accessibility or specific product needs. If proximity of the closest bank branch or suitability of product is the overriding reason to choose one type of loan over the other, we do not necessarily expect that the default rate on either type of loans will systematically differ.

Nevertheless competing hypotheses can be formed regarding the motivation for preferring one form of credit over the other and the expected default rates associated with that choice. The existence of Islamic banking *per se* is based on religion and for borrowers taking an Islamic loan plainly is a real economic decision (i.e., "putting your money where your mouth is"). An Islamic loan is – after all – a financial product with

[18] Apart from being functionally identical, conventional and Islamic loans are also subject to a similar tax treatment in Pakistan, in contrast to Malaysia for example where Islamic financing enjoys tax advantages.

certain characteristics one of which is its accordance with the *Shari'ah*. The text that prohibits interest payments, i.e., *Al Quran* and *Hadith*, also prohibits the misappropriation of other people's properties (i.e., "the eating other people's money in an unlawful way"). Those who choose to stick to one rule (i.e., the avoidance of interest payments) are expected to have a higher propensity to follow the other rule (i.e., do not default) as well. Therefore, if borrowers obtain Islamic loans because of their religious motives then they are expected to default less on their loans (we return to this conjecture later in the chapter).

Borrowers likely base their borrowing and default decisions on a rational comparison of the associated costs of the respective loan contracts. They, when choosing a loan, also take into account the expected cost of default. Banks can charge a penalty to a borrower defaulting on an Islamic loan, but unlike with a conventional loan they have to give that amount to charity.[19] Islamic lenders should, therefore, be reluctant to impose penalties to keep the borrower in a more solvent state. This makes the expected cost of an Islamic loan default for a borrower lower than the expected cost of a conventional loan default. Therefore, those who have a higher probability of default should prefer Islamic over conventional loans and we should observe a higher rate of default on Islamic loans.

On the other hand, lenders may set the penalties on conventional loans lower than on Islamic loans to attract fees from borrowers that are expected to being only temporarily

[19] If a client does not fully pay on the due date or soon after, and hence is delinquent and "defaults", the price cannot be changed under Islamic rulings nor can penalty fees be charged. In order to deal with the associated moral hazard of the clients (i.e., "the incentives (that) exist for default and abuse" (Iqbal (1987)), it is therefore nevertheless possible under *Shari'ah* to charge a penalty, but only if the money is given to charity. If the Islamic bank incurs a real loss (and not simply the opportunity cost of a delayed payment) then an external arbitrator can also allow the bank to actually keep (part of) the penalty.

unable to repay their loan commitments. Islamic loan contracts may further result in a swifter loss of access for the borrower to the financed object (a car, for example) than a conventional loan, especially when the latter is uncollateralized. In both cases the probability of default of an Islamic loan may be lower.

Like borrowers, banks base their lending decisions on a rational comparison of the associated costs and benefits. Loan officers at banks granting Islamic loans may for example target young and more risky borrowers to reap future business and higher returns, or they may be less experienced in assessing credit risk and less sensitive about the credit quality of their borrowers in general. In all these cases we will observe a higher rate of default on Islamic loans.

On the other hand, banks may be more concerned about the judicial risk when granting Islamic loans (Jobst (2007)). Not only can Islamic borrowers turn to *Shari'ah* courts, which rule on a case-by-case basis, but they can also seek redress in regular courts which may also turn the *Shari'ah* when faced with an Islamic loan (see Hussain (2011) for a primer on the Pakistani court system). To avoid this "double jeopardy" banks may screen Islamic borrowers more strictly or evergreen non-performing Islamic loans by rolling them into new Islamic loans or even conventional loans. All these actions will likely mitigate (or at least delay) Islamic loan default. But the opposite is also true and conventional loans may be challenged on the basis of the *Shari'ah*.

In sum, our analysis will need to rely on a variety of borrower, loan contract and bank controls and fixed effects to account for both observed and unobserved borrower, loan contract and bank heterogeneity. However, our definition of loan default (detailed later) and the wide-spread presence of standardized loans in our dataset all but rule out the relevance of the discussed judicial risk for our estimates.

3.2.3 Empirical Literature

Though the characteristics of borrowers, loan contracts and banks may differ between conventional and Islamic loans, their co-existence in Pakistan offers a unique opportunity to assess the effect of religion on the loan default rate. We are not the first to empirically study Islamic banking – we summarize relevant papers in Table 3.1. With a few exceptions most studies indicate there are no significant differences between conventional and Islamic banks in their business orientation, efficiency, asset quality, or stability for example (see Beck, Demirgüç-Kunt et al. (2010) for a comprehensive study).

Yet our study, as far as we are aware, is the first to access individual loan data to empirically investigate the differences between conventional and Islamic lending at the contract level, in particular with respect to each loan's repayment performance. A decisive step in our otherwise straightforward identification strategy exploits the concurrent repayment over time of both conventional and Islamic loans by the same borrower to the same bank.

3.3 Data and Identification Strategy

3.3.1 Data Description

We analyze loan level data obtained from the Consumer Protection Department (CPD) of the State Bank of Pakistan that maintains the domestic credit registry, i.e., the Credit Information Bureau (CIB). The monthly available data covers all business loans outstanding in Pakistan from 2006:4 to 2008:12, including both the run-up to and the

Table 3.1.
The table summarizes selected empirical work on Islamic banking.

Paper	***Sample***			***Analysis***		
	Countries	*Period*	*# Obs.*	*At Level*	*Explains*	*Finds (w.r.t. differences between conventional and Islamic banks / loans)*
Imam and Kpodar (2010)	117	1992-2006	1,520	Country - Year	Presence	Identifies various factors of diffusion
Mohamad, Hassan et al. (2008), Bader, Mohamad et al. (2008)	21	1990-2005	80	Bank	Efficiency	No differences
Chong and Liu (2009)	Malaysia	1995:04-2004:04	109	Month	Average interest rates	Islamic deposits are not interest-free, but are closely pegged to conventional deposits
Čihák and Hesse (2010)	18	1993-2004	2,347	Bank - Year	Z-score Bank strength	Small Islamic > small commercial Large commercial > large Islamic Small Islamic > large Islamic
Abdul-Majid, Saal et al. (2010)	10	1996-2002		Bank - Year	Technical inefficiency	Islamic banks are more technically inefficient
Abedifar, Molyneux et al. (2011)	22	2001-2008	1,230	Bank - Year	Bank stability, loan risk	No differences in insolvency risk; for Islamic banks lower loan loss reserves or problem loans but more frequent write-offs and lower recovery
Weill (2010)	17	2000-2007	1,301	Bank - Year	Bank market power (Lerner)	Islamic banks have somewhat less market power
Beck, Demirgüç-Kunt et al. (2010)	141	1995-2007	25,000	Bank - Year	Various bank measures	Few significant differences in business orientation, efficiency, asset quality, or stability
Ongena and Şendeniz-Yüncü (2011)	Turkey	2008	16,056	Bank - Firm	Firm bank choice	Islamic banks deal with young, multiple-bank, industry-focused and transparent firms
Pepinsky (2010)	Indonesia	2008:05/06	2,548	Consumers	Views on Islamic Finance	Islamic identity matters, not piety
Khan and Khanna (2010)	Pakistan	2008	9,078	Customers at two banks	Opening bank account	Religiosity and wealth matters when opening an Islamic bank account
Khan (2010)	Pakistan	2006:06-2009:03	995	Bank - Account	Growth deposit accounts	Islamic deposit accounts grow faster than conventional ones
This chapter	Pakistan	2006:04-2008:12	603,677	Loan - Month	Loan default	Islamic loans less likely to default

financial crisis[20] itself (for 16 months each if one takes 2007:08 as the start date of the crisis). All loans were granted in the local currency, the Pakistani rupee (code: PKR. 1 USD ~ 79 PKR, 1 EUR ~ 110 PKR on December 31st, 2008).

All banks in Pakistan are required to consult the CIB to verify the credit history of a loan applicant if the application exceeds PKR 500,000, and this requirement is similar for conventional and Islamic loans. The CIB data set is also, therefore, thought to be of good quality and has already been studied in different contexts by Khwaja and Mian (2005), Mian (2006), Khwaja and Mian (2008), and Zia (2008) for example.[21]

For each loan contract the CIB records the identity code and total exposure of the borrower and his location and industry. While we do not have financial information on the borrowers other than the precise loan characteristics, we do know that each borrower meets a specific threshold of financial soundness and is required to have a debt to equity ratio of 4:1 or better, and a current ratio of at least 1. Deviations from these requirements are allowed only in exceptional cases.

The CIB further reports key loan characteristics, such as the exact financial loan product name, default status, maturity, collateralization, whether cash is immediately

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[20] As the financial sector still maintains limited, albeit growing, linkages with global financial markets, Pakistan has been relatively well-insulated against contagion coming from international financial markets (Mansoor Ali (2009)). Actually Pakistan underwent a phase of fiscal tightening and a stringent monetary stance with discount rates remaining relatively high for the entire sample period (discount rates remained at 15 percent till April 2009), to address significant macroeconomic imbalances in the domestic economy, rather than as a response to the financial crisis and global economic slowdown.

[21] As in these papers we do not observe loan need and/or demand to account for the "double" selection bias, in the spirit of Heckman (1979), as in Cerqueiro (2009), Chakravarty and Yilmazer (2009), and Ongena and Popov (2011) for example. Neither do we observe loan applications to study the approval of applications and/or loan granting as in Brown, Kirschenmann et al. (2010), Jiménez, Ongena et al. (2011), and Puri, Rocholl et al. (2011) for example. But we are mainly interested in the differential loan default probabilities and control for observed and unobserved loan contract, borrower, bank, borrower-bank and time heterogeneity with combinations of characteristics and fixed effects. We also do not investigate riskiness at the bank or system level where Islamic deposit taking and limits on hedging and trading may be important.

disbursed or whether the loan is contingent, loan use for export or agricultural purposes, the approved limit and the remaining outstanding amount. The loan rate is also available for a subset of loans. Finally, the CIB records a unique and matching code for the lending bank and the branch where the loan is granted.

Our analysis of individual loan performance commences from the point when a unique credit decision is made. We therefore focus on new loans and loans that are renewed, extended or altered during the sample period. If a borrower obtains two different credit lines for example then both are considered as separate loans. During our 32-month sample period there are 1,238,574 loan-months related to distinct new loans out of a total of almost 4 million loan-months involving 107 financial institutions. Table 3.2 provides the sample details.

Table 3.2: Sample Composition

The table reports the composition of the sample. The sample period runs from 2006:04 to 2008:12. Loans to non-corporates include loans to financial intermediaries, public sector enterprises, local, provincial or federal governments, and other autonomous bodies. Micro, special and non-bank loans comprise loans smaller than PKR 50,000, loans larger than PKR 419,000,000, infrastructure and other special loans, and loans granted by financial institutions that are not registered as banks.

Variable	Number of Observations	Unit
All new loans granted	1,238,574	loan - months
Minus loans to non-corporates	363,221	loan - months
Minus micro, special and non-bank loans	252,047	loan - months
Sample loans observed each month	603,677	loan - months
Conventional	*571,478*	loan - months
Islamic	*32,199*	loan - months
Loans	152,730	loans
Borrowers	22,723	borrowers
Banks	40	banks

PKR = Pakistani Rupee. 1 USD ~ 79 PKR , 1 EUR ~ 110 PKR (December 31, 2008).

We discard all loans given to the federal, provincial or local governments, financial intermediaries, autonomous bodies and public sector enterprises because these non-corporate borrowers either cannot default on domestic currency loans, or have different default dynamics that are beyond the scope of this chapter. We also exclude from our

analysis micro loans of less than PKR 50,000 (retaining them does not alter results), loans larger than PKR 419,000,000, infrastructure and other special loans, and loans granted by financial institutions that are not registered as banks.

Our final dataset consists of 603,677 complete loan-month observations, which corresponds to 152,730 loans granted to 22,723 borrowers by 40 different banks.[22] Around 5 percent of our sample involves Islamic loans (32,199 loan-months), that are granted either by one of the six Islamic banks in our sample (15,153 loan-months) or by an Islamic branch or subsidiary of one of the twelve "mixed" banks that offer both conventional and Islamic loans (17,046 loan-months). All bank names (and types) are listed in Appendix 3-B. As of December 2008 there were 8,225 conventional and 514 Islamic bank branches.

About 43% of the Islamic financing in our sample is Murabahah financing, about 22% is Diminishing Musharakah, and about 24% is Ijarah and Ijarah wa'Iqtina. The pure profit and loss sharing (partnership) contracts, Mudaraba and Musharakah, constitute a very small fraction of the market, i.e., only 2% and 1%, respectively.

Crucially for our identification strategy is the observation that within the sample period quite a few borrowers and banks have balance sheets containing both conventional and Islamic loans. As indicated in Table 3.3 in total 91,008 loan-months involve borrowers that obtain both loan types, while in total 378,649 loan-months involve one of the twelve mixed banks. For 17,381 loan-months the same borrower within the sample period obtains conventional and Islamic loans from the same bank.

[22] This attrition we face (which is also caused by data availability) from 107 financial institutions to 40 banks is similar to Khwaja and Mian (2008) who study 42 banks out 145 financial institutions.

Table 3.3: Samples for borrowers and banks by loan types
The table reports the number of loan - months for the samples of borrowers and banks by loan type.

Loans observed each month		**Granted by banks that offer loans that are**			
		only conventional	**conventional and Islamic**	**only Islamic**	***Totals***
Obtained by borrowers with loans that are	**only conventional**	172,120	331,675	-	*503,795*
	conventional and Islamic	37,755	44,946	8,307	*91,008*
	only Islamic	-	2,028	6,846	*8,874*
	Totals	*209,875*	*378,649*	*15,153*	*603,677*

Table 3.4 reports detailed summary statistics for both conventional and Islamic loans. Crucial for our analysis is the definition of default. We define default to occur if 90 days after the maturity date or the date of an interest payment and/or installment, the debt balance remains unpaid. This definition for default is standard and identical for conventional and Islamic loans. In both cases default is not only self-reported by the banks upon prescription of the supervisor, but also carefully checked by the supervisor (every year around 80 percent of loans are randomly checked by supervisors, also for telltale signs of evergreening which if discovered carries penalties for the bank). Later on, we confirm the robustness of our findings if we define default to occur if loans payments are overdue for 180 days rather than 90 days.

We observe a substantially lower monthly default rate for Islamic compared to conventional loans. This difference (0.9 percent versus 0.5 percent) is not only statistically significant but also economically important. The difference in monthly default rate on Islamic loans granted by an Islamic branch or subsidiary of a conventional bank or by an Islamic bank (0.7 percent versus 0.2 percent) is not statistically significant. For completeness the table also reports the right-censored loan duration, i.e., the time to repayment, default or end of the sample period.

We measure the size of the borrower as the natural log of the sum of all credit facilities (loan limits) that are granted to a borrower by all banks. Borrowers with Islamic loans are larger and are located more often in big cities than other borrowers.

Conventional and Islamic loans statistically differ in all contract characteristics at the one percent level, though the differences are often economically small. According to the means conventional loans have a shorter maturity (15 versus 18 months), are less likely to be collateralized (93 versus 99 percent) and to involve an immediate cash disbursal (74 versus 82 percent) or a durable / fixed asset (14 versus 27 percent), are more likely to be for export or agricultural purposes (11 versus 4 percent and 4 versus 0 percent), and are smaller (PKR 23 versus 35 million) than Islamic loans. Interest rates, which we observe for 239,943 loan-months (i.e., 40 percent of our sample), are on average 2 percentage points lower for conventional than for Islamic loans. The medians point in a similar direction. Both conventional and Islamic loans can have a fixed or a variable "interest rate" (called "mark-up rate" in case of Islamic loans).

Conventional loans are proportionally more often granted by government, specialized, domestic or large banks than Islamic loans. In absolute terms most conventional and Islamic loans are granted by privately (often internationally) owned and domestically incorporated banks, such as Meezan, Standard Chartered, RBS, Dubai Islamic, Emirates Global for example.

Table 3.4: Summary Statistics on Conventional and Islamic Loans

The table reports the name, definition, and unit for all variables employed in the empirical analysis, and the number of observations, mean (and difference-in-means), standard deviation, median, minimum, and maximum seperately for conventional and Islamic loans (*and where indicated for Islamic loans granted by an Islamic branch or subsidiary of a conventional bank or by an Islamic bank*). Other Islamic loan types include Istisna, Salam, Musharakah, Modaraba, and Qard-e-Hasna loans. The sample period runs from 2006:04 to 2008:12. See the Appendix for the Regions, Industries and Bank types.

Variable	Definition	Unit	Number		Mean			St. Dev.		Median		Minimum		Maximum	
Islamic Loan	=1 if loan is an Islamic loan, =0 otherwise	0/1	32,199		0.053			0.225		0		0		1	
by Islamic Branch/Subsidiary	*=1 if the Islamic loan is granted by an Islamic branch or subsidiary of a conventional bank, =0 otherwise*	*0/1*	*17,046*		*0.028*			*0.166*		0		0		1	
by Islamic Bank	*=1 if the Islamic loan is granted by an Islamic bank, =0 otherwise*	*0/1*	*15,153*		*0.025*			*0.156*		0		0		1	
Murabahah	=1 if Islamic loan is a Murabahah loan, =0 otherwise	0/1	13,869		0.023			0.150		0		0		1	
Diminishing Musharakah	=1 if Islamic loan is a Diminishing Musharakah loan, =0 otherwise	0/1	7,219		0.012			0.109		0		0		1	
Ijarah or Ijarah wa' Iqtina	=1 if Islamic loan is a Ijarah or Ijarah wa' Iqtina loan, =0 otherwise	0/1	7,794		0.013			0.113		0		0		1	
Other	=1 if Islamic loan is an other Islamic loan type, =0 otherwise	0/1	3,317		0.005			0.074		0		0		1	
			Convent. Loan (*Bank*)	Islamic Loan (*Bank*)	Convent. Loan (*Bank*)	Islamic Loan (*Bank*)	Diff.	Convent. Loan (*Bank*)	Islamic Loan (*Bank*)	Convent. Loan (*Bank*)	Islamic Loan (*Bank*)	Convent. Loan (*Bank*)	Islamic Loan (*Bank*)	Convent. Loan (*Bank*)	Islamic Loan (*Bank*)
Loan Performance															
Loan Default	=1 if the loan defaults, =0 otherwise	0/1	571,478	32,199	0.009	0.005	***	0.092	0.068	0	0	0	0	1	1
	if the Islamic loan is granted by an Islamic branch or subsidiary of a conventional bank (Convent.) or by an Islamic bank (Islamic)	*0/1*	*17,046*	*15,153*	*0.007*	*0.002*		*0.083*	*0.045*	*0*	*0*	*0*	*0*	*1*	*1*
Duration	time to repayment, default or end of sample period	months	571,478	32,199	4.958	4.906	**	4.541	4.473	3	3	1	1	33	32
	if the Islamic loan is granted by an Islamic branch or subsidiary of a conventional bank (Convent.) or by an Islamic bank (Islamic)	*months*	*17,046*	*15,153*	*4.626*	*5.221*		*4.159*	*4.783*	*3*	*4*	*1*	*1*	*30*	*32*
Borrower Characteristics															
Size	the sum of all loans granted by all financial institutions to a borrower	mln. PKR	571,478	32,199	329.000	433.000		1,220.000	1,160.000	25	52	0	0	80,900	19,100
ln(Size)	the natural log of borrower size	-	571,478	32,199	16.849	17.618	***	2.475	2.143	16.816	17.523	10.820	10.820	25.109	23.659
Region	location in province or other distinct region	1 of 8	560,822	30,232											
Industry	affiliation to industry	1 of 68	556,848	29,893											
Loan Characteristics															
Maturity	period for which loan is granted	months	571,478	32,199	15	18	***	14	20	12	12	1	1	180	236
Collateral	=1 if loan is collateralized, =0 otherwise	0/1	571,478	32,199	0.929	0.991	***	0.257	0.096	1	1	0	0	1	1
Cash	=1 if loan involves immediate cash disbursal, =0 otherwise	0/1	571,478	32,199	0.739	0.817	***	0.439	0.387	1	1	0	0	1	1
Export	=1 if loan is used for export, =0 otherwise	0/1	571,478	32,199	0.106	0.038	***	0.308	0.192	0	0	0	0	1	1
Agricultural	=1 if loan is used for agricultural activities, =0 otherwise	0/1	571,478	32,199	0.037	0	***	0.189	0	0	0	0	0	1	0
Seniority of Charge	=1 if loan taken is the only one outstanding, =0 otherwise	0/1	571,478	32,199	0.379	0.360	***	0.485	0.480	0	0	0	0	1	1
Durable	=1 if loan is granted for durable/fixed asset, =0 otherwise	0/1	571,478	32,199	0.142	0.266	***	0.349	0.442	0	0	0	0	1	1
Interest Rate	the interest rate on the loan	%	234,398	5,545	12.695	14.795	***	4.214	2.301	13.50	14.63	1.000	1.000	42.80	42.05
Amount	the amount of cash disbursed or the granted limit	000 PKR	571,478	32,199	22,900	34,900	***	50,400	58,000	4,800	11,400	50	50	419,000	418,000
New Bank Branch	=1 if loan is granted by a bank branch opened after 2006:06, =0 oth	0/1	571,478	32,199	0.021	0.131	***	0.142	0.337	0	0	0	0	1	1

Variable	Definition	Unit	Number		Mean		St. Dev.		Median		Minimum		Maximum	
Bank Characteristics														
Government	=1 if bank is government-owned, =0 otherwise	0/1	571,478	32,199	0.133	0.087 ***	0.340	0.282	0	0	0	0	1	1
Specialized	=1 if bank is a specialized bank, =0 otherwise	0/1	571,478	32,199	0.038	0.000	0.191	0.000	0	0	0	0	1	0
Foreign	=1 if bank is foreign-owned, =0 otherwise	0/1	571,478	32,199	0.018	0.174 ***	0.132	0.379	0	0	0	0	1	1
Large	=1 if bank is 1 of the 5 largest by loan volume, =0 otherwise	0/1	571,478	32,199	0.367	0.055 ***	0.482	0.227	0	0	0	0	1	1
Time Period Characteristic														
Ramadan	=1 if Ramadan takes place during the month, =0 otherwise	0/1	571,478	32,199	0.132	0.131	0.339	0.337	0	0	0	0	1	1
Borrower District Characteristics														
Big City	=1 if borrower is located in a city with more than one million inhabitants, =0 otherwise	0/1	559,945	30,811	0.651	0.835 ***	0.477	0.371	1	1	0	0	1	1
Share Religious Political Parties	percentage of total votes obtained for National Assembly seats by the coalition of six religious-political parties in General Elections-2002 in the district of the borrower	%	560,454	31,357	13.911	17.378 ***	12.031	12.700	10.235	10.235	0	0	74.107	74.107
Share Private Post-Natal Care	percentage of women who used private (and not public) hospitals or clinics for post-natal care in the district of the borrower	%	560,734	31,424	0.208	0.229 ***	0.118	0.118	0.183	0.183	0	0	0.392	0.392

***, **, * indicate significance at 1%, 5% and 10% level, two-tailed. PKR = Pakistani Rupee. 1 USD ~ 79 PKR , 1 EUR ~ 110 PKR (December 31, 2008).

3.3.2 Duration Model

3.3.2.1 Intuition

This section develops the econometric methodology employed in analyzing the time until repayment or default of the individual bank loans, or "loan spells".[23] The hazard function in duration analysis provides us with a suitable method for summarizing the relationship between the time to default and the likelihood of default. The hazard rate effectively has an intuitive interpretation as the per-period probability of loan default provided the loan "survives" up to that period.

Repayment of a loan or the sample period's end may prevent us from ever observing a default on this loan. Such a loan spell can be considered right censored. Not knowing when the default would occur, means we are unable to observe the "true" time to default for these loan spells. With no adjustment to account for censoring, maximum likelihood estimation of the proportional hazard models produces biased and inconsistent estimates of model parameters. Accounting for right-censored observations will be accomplished in duration analysis by expressing the log-likelihood function as a weighted average of the sample density of completed loan spells and the survivor function of uncompleted spells. As the sample period runs from 2006:04 to 2008:12, but the median loan maturity is only twelve months, about 5% of all loans are right-

[23] As in McDonald and Van de Gucht (1999). Loans to small firms typically carry a relatively short maturity, often without early repayment possibilities; hence, we choose to ignore early repayment behavior captured in their competing risk model. Heckman and Singer (1984), Kiefer (1988) and Kalbfleisch and Prentice (2002) provide comprehensive treatments of duration analysis. Shumway (2001) and Duffie, Saita et al. (2007) discuss and employ empirical bankruptcy models. See also the application to the duration of bank-firm relationships in Ongena and Smith (2001) and Degryse, Kim et al. (2009), on which we base our discussion.

censored because of the sample period's end. As our sample consists out of only *new* loans granted from 2006:04 onwards, there is no left censoring problem.

3.3.2.2 Terminology

We begin by introducing terminology common to duration analysis and then describe the hazard function estimators. Let T represent the duration of time that passes before the occurrence of a certain random event. In the econometrics literature, the passage of time is often referred to as a "spell," while the event itself is called a "switch", which in this case will be the switch to the default state. A simple way to describe the behavior of a spell is through its survivor function:

$$S(t) = P(T \geq t),$$

which yields the probability that the spell T lasts at least to time t. The survivor function equals one minus the cumulative distribution function of T.

The behavior of a spell can also be described through the use of the hazard function. The hazard function determines the probability that a switch will occur, conditional on the spell surviving through time t, and is defined by:

$$\lambda(t) = \lim_{\Delta t \to 0} \frac{P(t \leq T < t + \Delta t | T \geq t)}{\Delta t} = \frac{-d \log S(t)}{dt} = \frac{f(t)}{S(t)},$$

where $f(t)$ is the density function associated with the distribution of spells. Neither the survivor function nor the hazard function provides additional information that could not be derived directly from $f(t)$. Instead, these functions present economically interesting ways of examining the distribution of spells.

The hazard function does provide a suitable method for summarizing the relationship between spell length and the likelihood of switching. When $\lambda(t)$ is increasing in t, the hazard function is said to exhibit positive duration dependence, because the probability

of ending the spell increases as the spell lengthens. Similarly, negative duration dependence occurs when $\lambda(t)$ is decreasing in *t*, and constant duration dependence indicates the lack of a relation between $\lambda(t)$ and *t*.

3.3.2.3 Estimators

When estimating hazard functions, it is econometrically convenient to assume a proportional hazard specification, such that:

$$\lambda(t, X(t), \beta) = \lim_{\Delta t \to 0} \frac{P(t \le T < t + \Delta t | T \ge t, X(t), \beta)}{\Delta t} = \lambda_0(t) \exp(\beta' X_t)$$

where X_t is a set of observable, possibly time-varying explanatory variables, β is a vector of unknown parameters associated with the explanatory variables, $\lambda_0(t)$ is the baseline hazard function, and $\exp(\beta' X_t)$ is chosen because it is nonnegative and yields an appealing interpretation for the coefficients, β. The logarithm of $\lambda(t, X(t), \beta)$ is linear in X_t. Therefore, β reflects the partial impact of each variable in *X* on the log of the estimated hazard rate.

The baseline hazard $\lambda_0(t)$ determines the shape of the hazard function with respect to time. The previous equation can be estimated without specifying a functional form for the baseline hazard. The Cox (1972) partial likelihood model bases estimation of β on the ordering of the duration spells. Because it specifies no shape for $\lambda_0(t)$, we refer to the Cox (1972) partial likelihood model as "semiparametric."

Two commonly used parametric specifications for the baseline hazard are the Weibull and the exponential distributions. The Weibull specification assumes:

$$\lambda_0(t) = \lambda\alpha t^{\alpha-1},$$

and allows for duration dependence. When $\alpha > 1$ ($\alpha < 1$), the distribution exhibits positive (negative) duration dependence, implying that the hazard increases (decreases) in time. The exponential distribution, which exhibits constant duration dependence, is nested within the Weibull as the case $\alpha = 1$. To estimate hazard functions using the Cox (1972) partial likelihood model, Weibull, exponential or other specifications one uses maximum likelihood methods. We rely both on parametric Weibull specifications to determine the shape of the hazard function with respect to time, but resort to Cox (1972) proportional hazard models to handle inclusion of many fixed effects.

3.4 Empirical Results

3.4.1 First Specifications

Table 3.5 presents maximum likelihood estimation results for different duration models. As a starting point, however, we first report estimates from parsimonious logit specifications (Models I and II). The dependent variable in Model I equals one if the loan defaults and equals zero otherwise and we retain only those 122,331 loans that are either repaid or defaulted within the sample period. The dependent variable in Model II equals one if the loan defaults in a certain month, and equals zero otherwise, and in this specification all 152,730 loans (also those that are right-censored) are included given that the estimation in this case is done at the loan-month level (there are 603,677 loan-months).

The estimated intercept terms in Models I and II that equal -3.228*** and -4.752***,[24] respectively, imply a probability of default for conventional lending that equals 4.3 percent per loan and 0.9 percent per loan-month. The estimated coefficients on the

[24] As in the Tables, *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Islamic Loan dummy that equal -0.500*** and -0.612***, respectively, suggest that the odds ratio almost halves when a loan is Islamic (results are unaffected when we add borrower, loan, and/or bank characteristics to the logit specifications).

Because we want to account for duration dependence, our main empirical results are established using duration models. Columns III to VI report results from a duration model that uses the Weibull distribution as a baseline hazard function.[25] In all parametric models errors are clustered at the borrower level. Model III features only the Islamic loan dummy (and an intercept) and in Model IV we add borrower size as well as 7 borrower region and 67 borrower industry dummies (all regions and industries are listed in Appendix 3-C) and loan characteristics. In Model V, we additionally control for bank type and time (i.e., year*month) fixed effects. In Model VI, we distinguish between Islamic loans that are granted by Islamic branches/subsidiaries of conventional banks and Islamic loans that are granted by Islamic banks.

The coefficient for the Islamic Loan dummy is negative and highly statistically significant in all specifications. This is the first main result: The hazard rate is substantially lower for an Islamic than for a conventional loan. This effect is robust (we will show) to many additional controls, including borrower, bank, and borrower*bank fixed effects and is economically large. Though we return later to

[25] In the next step we employ Cox proportional hazard models where the baseline hazard is left un-parameterized (we also estimate accelerated failure time models with a log-logistic distribution; results are similar and not further reported).

Table 3.5: All Banks

The table reports the maximum likelihood estimation results of logit and duration models. The dependent variable in Model I equals one if the loan defaults and equals zero otherwise. The dependent variable in Model II equals one if the loan defaults in a certain month, and equals zero otherwise. The dependent variable in all other models is the hazard rate. The estimations in Models I and II employ logit models. The estimations in Models III to VI employ parametric duration models with a Weibull distribution that includes a parameter of duration dependence. Model VII reports the results of a Cox-proportional hazard model and includes borrower fixed effects. The sample period runs from 2006:04 to 2008:12. For each variable in the specification the table reports the estimated coefficient, statistical significance level and standard error (below in parentheses). In all estimations involving parametric models, standard errors are clustered by borrower.

Models	I	II	III	IV	V	VI	VII
Estimation	Logit	Dynamic Logit	Weibull	Weibull	Weibull	Weibull	Cox
Dependent Variable	Loan Default 0/1	Loan-Month Default 0/1	Hazard Rate	Hazard Rate	Hazard Rate	Hazard Rate	Hazard Rate
Islamic Loan	-0.500***	-0.612***	-0.581***	-0.725***	-0.402**		-0.508***
	(0.148)	(0.144)	(0.144)	(0.157)	(0.158)		(0.193)
-- by Islamic branch or subsidiary of conventional bank						-0.262	
						(0.189)	
-- by Islamic Bank						-0.781***	
						(0.238)	
Borrower Characteristics							
ln(Size)				-0.00934	0.0148	0.0145	
				(0.0223)	(0.0247)	(0.0247)	
Loan Characteristics							
Maturity				0.00504**	0.00462*	0.00472**	0.00909***
				(0.00222)	(0.00238)	(0.00238)	(0.00138)
Collateral				-0.233**	0.0462	0.0476	-0.109
				(0.114)	(0.136)	(0.136)	(0.105)
Cash				2.302***	2.185***	2.181***	1.509***
				(0.109)	(0.111)	(0.112)	(0.109)
Export				-0.0152	0.00793	0.00947	-0.199***
				(0.211)	(0.204)	(0.204)	(0.0654)
Agricultural				-0.701**	-0.302	-0.301	0.245
				(0.318)	(0.251)	(0.251)	(0.381)
Bank Characteristics							
Government					0.216*	0.213*	0.503***
					(0.123)	(0.123)	(0.121)
Specialized					-0.113	-0.114	0.191
					(0.305)	(0.305)	(1.322)
Foreign					-0.828**	-0.745**	-0.552
					(0.339)	(0.335)	(0.374)
Large					0.719***	0.718***	0.575***
					(0.154)	(0.153)	(0.0984)
Intercept	-3.128***	-4.752***	-4.759***	-6.689***	-8.752***	-8.745***	
	(0.0620)	(0.0608)	(0.0995)	(0.476)	(1.169)	(1.168)	
Borrower Region dummies (7)	No	No	No	Yes	Yes	Yes	No
Borrower Industry Dummies (67)	No	No	No	Yes	Yes	Yes	No
Year*Month Fixed Effects	No	No	No	No	Yes	Yes	Yes
Borrower Fixed Effects	No	No	No	No	No	No	Yes
Log Pseudolikelihood	-20,995	-29,115	-25,121	-23,013	-22,157	-22,154	-9,510
α (Duration Dependence)	-	-	0.978	0.983	0.962	0.962	-
$Chi^2(k)$ [LR in VI, VII, IX & XIII, Wald in others]	11	18	16	4,009	4,479	4,437	1,631
Number of regressors minus one (k)	1	1	1	81	117	118	42
Number of Loan-Months	-	603,677	603,677	582,759	582,759	582,759	603,677
Number of Loans	122,331	152,730	152,730	149,302	149,302	149,302	152,730
Number of Borrowers	19,063	22,723	22,723	21,866	21,866	21,866	22,723

***, **, * indicate significance at 1%, 5% and 10% level, two-tailed.

economic relevancy in more detail, by way of preview: The coefficient in Model V for example implies that the hazard rate of an Islamic loan is only 2/3rd (= $e^{-0.402}$) of the hazard rate on a conventional loan.

Model VI further shows that especially Islamic loans granted by Islamic banks have a lower hazard rate. The hazard rate of Islamic loans issued by Islamic branches or subsidiaries of conventional banks, though lower, is not statistically different from that of all conventional loans. However, our analysis in Table 3.7 will show that the hazard rate of Islamic loans issued by Islamic branches or subsidiaries of these mixed banks is statistically lower than the hazard rate of the conventional loans issued by these mixed banks. Hence the picture that arises is that Islamic loans issued by Islamic banks have the lowest hazard rate and that conventional loans issued by purely conventional banks have a lower hazard rate than those issued by mixed banks.

Before further model developments, however, we briefly review the estimated coefficients on the control variables. In our sample, we do not find a robust relationship between borrower size and hazard rates. With respect to loan characteristics, we find the hazard rate to be higher for loans with a longer maturity and those involving an immediate cash disbursal (in which case borrowers likely have to start paying back sooner), but lower for collateralized and agricultural loans (though the statistical significance of these findings later disappears somewhat).

Hazard rates are significantly higher for loans issued by government banks and by those belonging to the largest five banks by loan volume, but lower for loans issued by foreign banks. Our finding of higher hazard rates for loans issued by government banks is consistent with results in Khwaja and Mian (2005), who find that loans given to politically connected firms by government banks in particular tend to have to up to 50

percent higher default rates. Finally, we note that the parameter α is measuring the duration dependence in the baseline hazard specification and that this estimated parameter is not significantly different from one, indicating that there is neither positive nor negative duration dependence.

Borrower, loan and/or bank characteristics that differ between conventional and Islamic loans may be responsible for the estimated difference in the hazard rates. We now systematically investigate each of these possible sources of variation.

3.4.2 Differences between Borrowers that Obtain Conventional and Islamic Loans?

Models IV and V in Table 3.5 control for borrower size, region, and industry, for example, yet these controls may not capture all borrower heterogeneity. In Model VII we therefore include borrower fixed effects to capture all time-invariant unobservable and observable borrower heterogeneity in a Cox proportional hazard model that leaves the baseline hazard un-parameterized (including this many fixed effects in a Weibull specification is technically impossible in our setting). We designate this specification as our benchmark. Notice that we are able to control for borrower fixed effects because our dataset includes borrowers that have both conventional and Islamic loans (we label such borrowers as "mixed borrowers"), some of which default on one or more loans but not on others (this is possible given our 90 days loan-specific definition of non-performance).

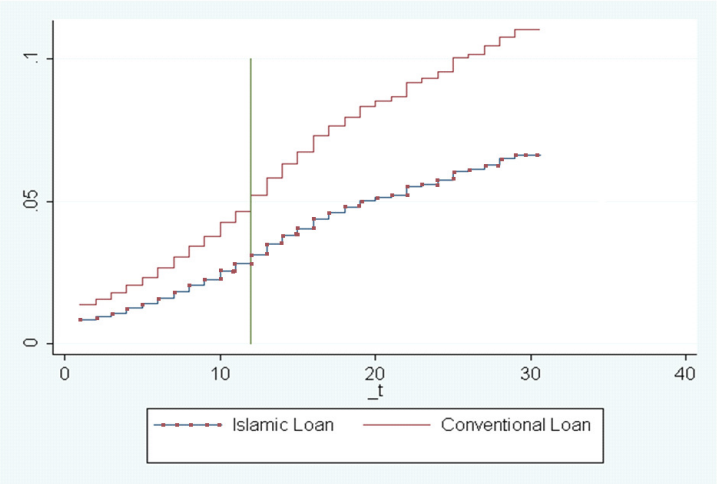
We find that the parameter estimate for the Islamic loan dummy remains negative and statistically significant. Moreover, its magnitude is comparable to the other specifications, and even slightly more negative than in the previous most complete specification without borrower fixed effects (in Model V). Hence these estimates

indicate that within the 32-month sample period (but controlling for year*month fixed effects) the same borrower is more likely to default on a conventional loan than on an Islamic loan. We revisit this finding, and especially its potential relationship with religion, in Section III.E.

For our benchmark Model VII we more closely assess the economic relevancy of our findings for a one-year (median), collateralized, cash loan that is not for export or agricultural purposes, or granted by a government, specialized, foreign or large bank. Figure 3.1 displays the resulting schedule of the cumulative hazard of conventional and Islamic loans respectively. After one year (the median loan duration), the difference in the cumulative hazard is already more than 2 percent. This first-year cumulative hazard rate on conventional loans equals 5.2 percent, not uncommon for loans in a developing economy, while the first-year cumulative hazard rate for Islamic loans equals 3.1 percent, more equal to the default rates on loans commonly observed in developed economies.

Figure 3.1

The figure displays the cumulative hazard based on the estimated coefficients of Model VII in Table 5 for a one-year (median) conventional or Islamic loan with all other covariates set at their mean. The cumulative hazard after 12 months for a conventional loan equals 5.2%, for an Islamic loan it equals 3.1%.



3.4.3 Differences in the Loan Contracts?

Despite the controls for the loan maturity, collateralization, cash disbursal, and the export or agricultural purpose of the loan, it is still possible that differences in loan contract characteristics between conventional and Islamic loans would explain the difference in hazard rates. In Table 3.6 we report a set of specifications that addresses this possibility.

We start by excluding the 45,254 non-cash facilities that may differ more between conventional and Islamic loans in other loan characteristics. We are left with 107,476 loans and re-estimate all duration models in Table 3.5. Model I in Table 3.6 reports the estimates for the representative benchmark specification. Results are almost unaffected.

Our data set does not include loan seniority, possibly because seniority of small business loans is often by default based on their precedence in time. In Model II we therefore include a variable *Seniority of Charge* that equals one if the loan is the only one outstanding, and equals zero otherwise. The coefficient on this new variable is insignificant, while the coefficient on Islamic Loan is unaffected.

One variable we have not included yet in the specifications, as we know it is rather coarsely measured, is the durability or fixity of the asset that is financed with the loan. The bank's ownership claim in a *Murabahah* contract will be quite limited (in time) if the financed asset is for example an inventory of raw materials that is being used in the production process (recall that almost all Islamic loans are in addition also collateralized). Model III in Table 3.6 includes the variable *Durable* that equals one if the loan is granted for a durable or fixed asset, like a plant, machinery, real estate or automobile for example, and equals zero otherwise, in the representative benchmark

Table 3.6: All Banks: Robustness

The table reports the maximum likelihood estimation results of duration models. Models I to VIII report the results of a Cox-proportional hazard model and include borrower fixed effects. The estimation in Model IX employs a parametric duration model with a Weibull distribution that includes a parameter of duration dependence. The sample used in Model I contains only cash loans. The sample used in Model VII contains Murabaha and conventional loans given as working capital and term finance (excluding all other credit facilities, i.e., mortgage finance, leases, export finance, agricultural finance and off-balance financing). The sample period used in Model IX starts in 2006:07. Otherwise the sample period runs from 2006:04 to 2008:12. The dependent variable is the hazard rate. For each variable in the specification the table reports the estimated coefficient, statistical significance level and standard error (below in parentheses). In all estimations involving parametric models, standard errors are clustered by borrower.

Models	I	II	III	IV	V	VI	VII	VIII	IX
Alteration	Only Cash Loans	Seniority Added	Durable Added	Interest Rate Added	Loan Amount Added	By Islamic Loan Type	Murabahah and Similar Conv.	180-Days Default	New Bank Branch
Islamic Loan	-0.535***	-0.509***	-0.498***	-0.406**	-0.506***		-0.554*	-0.740**	-0.259*
	(0.203)	(0.193)	(0.193)	(0.192)	(0.193)		(0.298)	(0.308)	(0.158)
-- Murabaha						-0.445*			
						(0.240)			
-- Diminishing Musharakah						-0.886*			
						(0.469)			
-- Ijarah						-0.558*			
						(0.310)			
-- Other						-0.263			
						(0.456)			
Islamic Loan * New Bank Branch									-2.384**
									(1.058)
Borrower Characteristics									
ln(Size)									0.0181
									(0.0247)
Loan Characteristics									
Maturity	0.00653***	0.00907***	0.00950***	0.00510*	0.00872***	0.00924***	0.00966***	0.0111***	0.00485**
	(0.00150)	(0.00138)	(0.00142)	(0.00305)	(0.00138)	(0.00140)	(0.00208)	(0.00190)	(0.00233)
Collateral	-0.0968	-0.110	-0.110	-0.244	-0.105	-0.111	-0.323**	-0.167	-0.0429
	(0.115)	(0.105)	(0.105)	(0.157)	(0.105)	(0.105)	(0.158)	(0.139)	(0.135)
Cash		1.509***	1.518***	1.161***	1.500***	1.505***		1.543***	-2.203***
		(0.109)	(0.109)	(0.338)	(0.109)	(0.109)		(0.151)	(0.112)
Export	-0.207***	-0.199***	-0.204***	0.156	-0.192***	-0.200***		-0.214***	0.00234
	(0.0662)	(0.0654)	(0.0654)	(0.128)	(0.0650)	(0.0654)		(0.0793)	(0.203)
Agricultural	0.267	0.246	0.215	0.385	0.247	0.243		-0.631	-0.300
	(0.386)	(0.381)	(0.382)	(0.581)	(0.380)	(0.381)		(0.671)	(0.251)

Models	I	II	III	IV	V	VI	VII	VIII	IX
Alteration	Only Cash Loans	Seniority Added	Durable Added	Interest Rate Added	Loan Amount Added	Type	Similar Conv.	180-Days Default	New Bank Branch
Seniority of Charge		0.0204							
		(0.0916)							
Durable			-0.112						
			(0.0878)						
Interest Rate				0.0277**					
				(0.0116)					
Amount					0.001***				
					(0.0005)				
New Bank Branch									-1.199***
									(0.293)
Bank Characteristics									
Government	0.533***	0.503***	0.498***	0.383	0.442***	0.504***	0.561***	0.202	0.199
	(0.125)	(0.121)	(0.121)	(0.279)	(0.123)	(0.121)	(0.186)	(0.162)	(0.123)
Specialized	0.0772	0.187	0.239		0.145	0.191	-0.419	-36.03	-0.138
	(1.440)	(1.321)	(1.343)		(1.315)	(1.322)	(0.443)	(38.000)	(0.305)
Foreign	-0.529	-0.551	-0.558	-0.201	-0.554	-0.507	-0.596	0.189	-0.908***
	(0.401)	(0.374)	(0.374)	(0.553)	(0.372)	(0.379)	(0.674)	(0.481)	(0.339)
Large	0.570***	0.574***	0.568***	0.984***	0.566***	0.578***	0.528***	0.774***	0.694***
	(0.102)	(0.0983)	(0.0984)	(0.195)	(0.0984)	(0.0985)	(0.138)	(0.130)	(0.150)
Intercept									-8.206***
									(1.153)
Borrower Region dummies (7)	No	No	No	No	No	No	No	No	Yes
Borrower Industry Dummies (67)	No	No	No	No	No	No	No	No	Yes
Year*Month Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Borrower Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Log Pseudolikelihood	-9,018	-9,510	-9,510	-2,922	-9,506	-9,510	-4,302	-5,771	-22,062
α (Duration Dependence)	-	-	-	-	-	-	-	-	0.961
Chi^2(k) [LR in VI, VII, IX & XIII, Wald in others	1,215	1,631	1,632	545	1,639	1,632	814	1,238	7,419
Number of regressors minus one (k)	41	43	43	41	43	45	38	42	119
Number of Loan-Months	448,333	603,677	603,677	239,946	603,677	603,677	257,979	613,218	580,810
Number of Loans	107,476	152,730	152,730	54,952	152,730	152,730	61,184	152,730	148,669
Number of Borrowers	19,084	22,723	22,723	13,628	21,574	21,574	14,652	22,041	21,837

***, **, * indicate significance at 1%, 5% and 10% level, two-tailed.

model. The coefficient on this new variable is also insignificant, while the coefficient on Islamic Loan is again unaffected.

Next, and to account at once for other loan characteristics that are not recorded and for time-varying borrower heterogeneity that is also unobservable to us but that may be observable to the bank, we add the loan rate (*Interest Rate*) in Model IV or the individual loan amount (*Amount*) in Model V. As described in the data section, we have the interest rate for only 40 percent of our sample observations. As expected, we find a positive relation between the loan rate or size, and the probability of default. However, the estimate for the Islamic loan dummy remains almost unaltered, i.e., -0.406** and -0.506***, respectively.

Next, we perform additional robustness checks with respect to collateralization and Islamic loan type (to conserve space we chose not to tabulate the estimated coefficients). Banks possibly adjust collateralization depending on borrower condition or additional financing, and may do so differently ─ if not in principle, then in practice ─ for the two types of loans. To account for this possibility we simply remove collateral from the base specification. The coefficient on the Islamic loan dummy remains virtually unaffected. To account for the potentially differential nature of collateral in conventional and Islamic lending we add an interaction between the Collateral and Islamic Loan dummies to our benchmark specification. The interaction effect is, however, not statistically significant, and the coefficient on the Islamic Loan dummy remains again unaffected. Similarly we add interactions between all loan contract characteristics and the Islamic loan dummy. With the exception of the negative coefficient on the interaction with maturity, none of the estimated coefficients on the

other interactions is statistically significant, and Islamic loans are still found to default less likely than conventional loans.

To account for the different types of Islamic loan contracts, in Model VI we split the Islamic Loan dummy into four loan type dummies, i.e., *Murabahah*, *Diminishing Musharakah*, *Ijarah* or *Ijarah wa'Iqtina*, and Other Islamic loans. The estimated coefficients on the four dummies equal -0.445*, -0.886*, -0.558*, and -0.263, respectively, confirming our findings so far.

We further exclude *Musharakah* and *Mudarabah* contracts (both types are more similar to equity financing than to conventional bank credit), or even more tightly in Model VII restrict the sample to *Murabahah* loans and similar conventional loans, i.e., term finance and working capital (excluding all other credit facilities such as mortgage finance, leases, export finance, agricultural finance and off-balance financing for example). In both cases results are unaffected with estimated Islamic Loan coefficients that equal -0.500** (untabulated) and -0.554* (Model VII), respectively.

In Model VIII in Table 3.6 we redefine default to occur only after 180-days. Shorter duration or – when present – tighter covenants for example could result in earlier non-performance. But results are again unaffected (note that though the number of loans remains equal to 152,730, the number of loan-months increases to 613,218, because non-performing loan spells are now right-censored 90 days later).

Finally, in Model IX we study the default on the new loans at bank branches that were opened after 2006:06, i.e., the month with the first six-monthly listing of bank branches within our sample period (4,061 new loans that were originated before this first listing were removed). Loans at new branches may have different characteristics, but of course

also the characteristics of the borrowers (and loan officers) there may differ. Unfortunately because of multicollinearity we have to drop the borrower fixed effects.[26]

At new bank branches the hazard of conventional loans is one third and the hazard of Islamic loans one tenth of the hazard of conventional loans at existing branches. Yet, at existing branches the hazard of Islamic loans is now three-quarters of the hazard of conventional loans at existing branches. So it seems that especially new Islamic branches attract re-paying borrowers. Alternatively, if the new branches would attract worse customers, the loan officers there are aware of the externality of the other banks' screening (Broecker (1990)) and screen themselves more strictly, but then especially so when the branch is Islamic and grants Islamic loans.

In sum, it does not seem to be the case that only differences in loan contract characteristics between conventional and Islamic loans can explain their difference in hazard rates.

3.4.4 Differences in the Banks that Grant the Conventional and Islamic Loans?

While we do correct for bank type, our dataset does not include more detailed bank characteristics, such as efficiency,[27] capital ratios, overall riskiness of the loan portfolio, and/or liability structure, for example. Controlling for (time-invariant) bank fixed

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[26] One additional *caveat* when interpreting the estimates is that the tighter right-censoring for loans granted at branches that open later during the sample period may bias the estimated hazard for new branches downward if duration dependence is convex.

[27] Shahid, ur Rehman et al. (2010)find almost no differences in efficiency scores between five conventional and five Islamic banks in Pakistan during the period 2005 to 2009, except for the year 2008. For a similarly sized sample and the same time period in Pakistan, Jaffar and Manarvi (2011) find that the conventional banks had the same asset quality, a somewhat lower capital and liquidity position, but higher management quality and earning ability than the Islamic banks.

effects may be important, as default rates may be due to bank-specific clientele effects, risk-taking incentives, and/or screening and monitoring technology.

We therefore include bank fixed effects in a variety of models estimated on the set of loans that are issued only by mixed banks that offer both conventional and Islamic loans. This reduces our sample to 378,649 loan-month observations (15,653 borrowers for a total of 109,157 loans). Estimation results are tabulated in Table 3.7 and the model line-up is similar to Table 3.5.

Models I and II in Table 3.7 are comparable to Models III and IV in Table 3.5, except that the estimation results are based on the reduced sample. While the parameter estimates on the controls are mostly similar, we find a substantially stronger Islamic loan effect in the reduced compared to the full sample. This strong effect remains when we introduce first bank fixed effects (and a bank-specific parameter of duration dependence) in Model III, then both borrower and bank fixed effects in Model IV, and finally borrower*bank fixed effects in Model V. In the latter model the hazard rate on Islamic loans is only one fifth of the hazard rate on conventional loans ($=e^{-1.577}$). Hence the same borrower obtaining conventional and Islamic loans from the same bank within the sample period is five times more likely to default on the conventional loan(s) than on the Islamic loan(s).

In Model VI we contrast these mixed borrowers with those having only conventional loans from the mixed banks. The latter type of borrowers are three times more likely to default on their conventional loans than the mixed type of borrowers on their loans ($=e^{1.184}$), while the mixed and Islamic-only borrowers do not differ on average.

Table 3.7: Mixed Banks

The table reports the maximum likelihood estimation results of duration models. Models I to III and V to VII employ parametric duration models with a Weibull distribution that includes a parameter of duration dependence. Model IV reports the results of a Cox-proportional hazard model and includes borrower fixed effects. The sample includes only loans given by banks that grant both conventional and Islamic loans and the sample period runs from 2006:04 to 2008:12. The dependent variable is the hazard rate. For each variable in the specification the table reports the estimated coefficient, statistical significance level and standard error (below in parentheses). In Models I to III and V to VII standard errors are clustered by borrower.

	I	II	III	IV	V	VI	VII
Islamic Loan	-1.601***	-1.869***	-1.654***	-2.015**	-1.554*		-1.374***
	(0.358)	(0.384)	(0.381)	(0.865)	(0.928)		(0.326)
-- Borrowers with conventional and Islamic loans						0.196	
						(0.580)	
-- Borrowers with only conventional loans						1.184***	
						(0.426)	
-- Borrowers that switch to Islamic loans (from conventional)							-0.877*
							(0.464)
-- Borrowers that switch to conventional loans (from Islamic)							-0.350
							(0.956)
Borrower Characteristics							
ln(Size)		0.0147	0.0345			0.0431	0.0429
		(0.0288)	(0.0291)			(0.0302)	(0.0304)
Loan Characteristics							
Maturity		-0.00446	-0.00799*	0.00500*	0.0071***	-0.00807*	-0.00804*
		(0.00390)	(0.00429)	(0.00256)	(0.00276)	(0.00429)	(0.00429)
Collateral		-0.479***	-0.559***	-0.204*	-0.238*	-0.551***	-0.552***
		(0.137)	(0.136)	(0.123)	(0.127)	(0.137)	(0.137)
Cash		2.485***	2.357***	1.800***	1.786***	2.350***	2.358***
		(0.148)	(0.160)	(0.169)	(0.178)	(0.159)	(0.159)
Export		-0.0254	-0.0608	-0.239***	-0.173**	-0.0558	-0.0611
		(0.255)	(0.238)	(0.0757)	(0.0790)	(0.236)	(0.237)
Agricultural		0.238	0.0639	0.700	0.523	0.0591	0.0642
		(0.193)	(0.199)	(0.443)	(0.444)	(0.199)	(0.199)
Intercept	-4.734***	-6.657***	-6.907***			-8.162***	-7.004***
	(0.130)	(0.614)	(1.224)			(1.286)	(1.232)
Borrower Region dummies (7)	No	Yes	Yes	No	No	Yes	Yes
Borrower Industry Dummies (67)	No	Yes	Yes	No	No	Yes	Yes
Year*Month Fixed Effects	No	No	Yes	Yes	Yes	Yes	Yes
Borrower Fixed Effects	No	No	No	Yes	No	No	No
Bank Fixed Effects	No	No	Yes	Yes	No	Yes	Yes
Borrower*Bank Fixed Effects	No	No	No	No	Yes	No	No
Log Pseudolikelihood	-17,336	-15,824	-14,695	-6,863	-7031	-14,679	-14,674
α (Duration Dependence)	1.009	1.026	by bank	-	-	by bank	by bank
Chi^2(k) [LR in VI-X, Wald in other]	20	6,334	7,390	1,280	1019	7,768	7,819
Number of regressors minus one (k)	1	81	123	46	36	124	125
Number of Loan-Months	378,649	372,415	372,415	378,649	378,649	372,415	372,415
Number of Loans	109,157	107,944	107,944	109,157	109,157	107,944	107,944
Number of Borrowers	15,653	15,355	15,355	15,653	15,653	15,355	15,355

***, **, * indicate significance at 1%, 5% and 10% level, two-tailed.

In sum, these findings combined suggest that at mixed banks the hazard rates increase as follows: (1) Islamic loans by mixed borrowers, (2) Islamic loans by Islamic-only borrowers, (3) conventional loans by conventional-only borrowers, and (4) conventional loans by mixed borrowers. Or put differently, at mixed banks the difference in hazard rates between conventional and Islamic loans for mixed borrowers is larger than the difference in hazard rates between conventional loans for conventional-only borrowers and the Islamic loans for Islamic-only borrowers.

Why this wider difference in hazard rates? One possible explanation could reside in the penalties banks charge in case of default.[28] Recall that those penalties flow to the bank in case of non-performance on a conventional loan and to a charity in case of an Islamic loan. In case banks would set penalties optimally (but disregarding other loan terms) they would set the penalties on conventional loans lower than on Islamic loans, especially for borrowers that mix loan types and that are of an intermediate credit quality.[29]

Yet, we do not think differential penalties are the explanation here. First, anecdotal evidence from supervisors with ample field experience in Pakistan suggests that banks may actually set the penalties on conventional and Islamic loans equal to each other. In Appendix 3-D we report the penalties we gleaned from bank websites recently for

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[28] Borrowers may also maintain other conventional and Islamic bank products (deposits for example) that are priced jointly with the conventional and Islamic loans respectively by a separate conventional or Islamic bank desk. Any cross-subsidization across products taken by borrowers done at the bank level is absorbed by the borrower*bank fixed effects however.

[29] In this way banks would entice non-performance on conventional loans and not only capture the penalties (when paid) on the non-performing conventional loan(s), but also assure continued payment of the higher loan rates on the Islamic loan(s). This penalties strategy may be optimal for borrowers of an intermediate quality, who with a probability between zero and one pay the penalties and repay both loans. For really bad or really good mixed borrowers differentiating penalties between conventional and Islamic loans may be marginally less important. Of course, *ex ante* banks likely set penalties jointly with the interest (mark-up) rate and other loan terms and/or could provide for example repayment *boni*.

different household loan types; while not necessarily equal to those specified on the business loans in our study, the penalties the banks list on their website suggest that the penalties on Islamic loans may – if anything – even be lower than those on conventional loans.

Second, when introducing in a variety of specifications the interactions of the Islamic loan dummy with – as a proxy for borrower quality – the observed loan rate and the rate squared, the estimated coefficients on the interaction terms are statistically insignificant but are actually pointing in an opposite direction (i.e., for intermediate loan rate borrowers the difference in the hazard rate between conventional and Islamic loan is minimal not maximal as we would expect if penalties are set optimally).

3.4.5 Borrower, Bank or Loan Characteristics? Or Religion?

Until now, we have found consistent evidence that the same borrower is less likely to default on Islamic than on conventional loans obtained from the same bank, and that when borrowing from a mixed bank the difference in hazard rates between conventional and Islamic loans for these mixed borrowers is larger than the difference in hazard rates between conventional loans for conventional-only borrowers and the Islamic loans for Islamic-only borrowers.

One possible explanation for these robust findings is that borrowers may choose not to default on Islamic loans because of their individual religious beliefs. As argued before, the motivation to take the Islamic loan may also discourage the borrower from defaulting on it.

In Model VII in Table 3.7 two variables are introduced that capture whether borrowers (that have both type of loans) during the sample period switch to Islamic or to conventional borrowing, i.e., whether during the sample period conventional loans were

obtained first or later than Islamic loans. Those borrowers that switch to Islamic borrowing may be, given the recency of their decision, even more motivated not to default on their Islamic loans.

For this exercise the start of the sample period presents a severe left-censoring problem, i.e., we cannot observe those loans that are no longer outstanding. One additional *caveat* when interpreting the estimates is that the tighter right-censoring for loans that are recently granted may bias the estimated hazard for new loans downward if duration dependence is convex. Hence one has to compare the difference between the two switching coefficients. Though not statistically different, the estimates suggest that individual motivation may play a role. Those borrowers that only recently turned to Islamic loans are even less likely to default on their Islamic loans than those that switched to conventional loans.

While the most fervent religious believers may prefer to obtain Islamic loans only, intermediate fervency may result in mixed borrowing.[30] Hit by a negative shock large enough to overwhelm their religious resistance to loan default, Islamic-only borrowers have no choice but to default on one of their Islamic loans. On the other hand mixed borrowers do have a choice and despite their lower fervency may on the margin more often decide not to default on their Islamic loans than on their conventional loans.[31]

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[30] We do not think that intermediate piousness and mixed borrowing *per se* negates religion as a possible determinant of lower Islamic loan default ("some people pray but do not fast"). Of course mixed borrowing may also arise from specific credit needs such as corporate credit cards, export finance supported by the SBP, specific discounting of bills, etc.. Many Islamic scholars would even argue that borrowing at some interest is allowed if the borrower is to meet un-avoidable necessities.

[31] Appendix E further illustrates how the different degrees of individual religiosity of the borrowers may create the differentials in default probabilities we observe. If both the probability the borrowers take a conventional loan and the probability the borrowers default on a loan decrease in the degree of their religiosity, then Islamic loans are on average less likely to default than conventional loans. If a borrower takes two loans, intermediate religiosity is more likely to result in a conventional and Islamic loan being taken. If a secular borrower is indifferent between defaulting on the conventional or Islamic loan, and a

To establish beyond any doubt that religious beliefs matter for loan default one would need an objective measurement of religiosity for each individual borrower. As far as we are aware no existing research has had access to such a measure,[32] and neither do we. In Table 3.8 we therefore introduce a number of specifications that are a first step in identifying whether religion in this setting matters for loan default.

Model I in Table 3.8 introduces a variable *Ramadan* that equals one if the month is in the Ramadan period and equals zero otherwise.[33] If either (1) the local network effect of

religious borrower prefers to default on the conventional loan, then the ratio of the Islamic over conventional loan default probabilities may be smaller for the two-loan borrowers than for the one-loan borrowers (which is precisely what our findings so far suggest). An alternative explanation for our findings could be that the bank loan officer similarly driven by religious beliefs – maybe the loan officer works for an Islamic branch because of religious beliefs or is influenced by its orientation – is lenient and helps (or convinces) the borrower in one way or another to avoid non-performance on the Islamic loan rather than on the conventional loan. The imputed interest rate on Islamic loans is more than 200 basis points higher than on conventional loans suggesting that borrowers may be "more religiously motivated" than banks (though it is important to note that the loan rate is only collected or imputed for less than half the loans, and that in the case of Islamic loans it may also include some insurance fees). Hence we prefer to discuss our findings in terms of borrower rather than in terms of loan officer religiosity.

[32] Al-Azzam, Hill et al. (2011) find that the repayment delay on 160 *group* loans in Jordan is negatively affected by the percentage of group members who pray five times a day. More broadly Guiso, Sapienza et al. (2011) document that homeowners that find it "*morally wrong* to walk away" are less likely to say that they are willing to default when the value of their home equity falls below a certain threshold even if they can afford to pay the monthly mortgage costs.

[33] During the sample period *Ramadan* took place from September 23rd, 2006, to October 22nd, 2006, from September 13th, 2007, to October 12th 2007, and from September 1st, 2008, to October 1st, 2008. In 2006 and 2007 we consider September and October *Ramadan* months, in 2008 only September.

Table 3.8: Religion as a Motivator to Perform on Loans

The table reports the maximum likelihood estimation results of duration models. All estimations except in Model I employ parametric duration models with a Weibull distribution that includes a parameter of duration dependence. Model I reports the results of a Cox-proportional hazard model and includes quarter dummies and borrower fixed effects. Estimations in Models II to V include only those loans that are granted in the four provinces and the federal capital (i.e., regions where Pakistani political parties can operate and key statistics are recorded) and exclude loans in other regions administered by Pakistan. The sample period runs from 2006:04 to 2008:12. The dependent variable is the hazard rate. For each variable in the specification the table reports the estimated coefficient, statistical significance level and standard error (below in parentheses). In all estimations below involving parametric models, standard errors are clustered by borrower.

Models	I	II	III	IV	V
		Share = Religious Political Parties		*Share* = Post-Natal Private Care	
Islamic Loan	-0.569***	-0.463	-0.859	-2.133**	-1.667
	(0.191)	(0.450)	(0.715)	(0.925)	(1.185)
Islamic Loan * Ramadan	-0.696*				
	(0.363)				
Islamic Loan * *Share*		0.0399**	0.0429	13.13**	9.050
		(0.0169)	(0.0269)	(6.533)	(9.136)
Islamic Loan * Big City		0.0108	0.206	0.923	-0.331
		(0.511)	(0.907)	(1.004)	(1.360)
Islamic Loan * *Share* * Big City		-0.0474**	-0.170***	-10.830	-10.300
		(0.0202)	(0.0567)	(6.666)	(9.384)
Added Variables					
Ramadan	-0.0481				
	(0.0600)				
Share		0.00588	0.00687	0.324	-0.767
		(0.00462)	(0.00525)	(0.837)	(0.870)
Share * Big City		0.000510	0.00193	-0.268	1.350
		(0.00676)	(0.00756)	(1.021)	(1.100)
Loan Characteristics					
Maturity	0.0125***	0.00396*	-0.00912**	0.00397*	-0.00828**
	(0.00133)	(0.00238)	(0.00418)	(0.00239)	(0.00417)
Collateral	0.331***	-0.022	-0.593***	-0.0253	0.577***
	(0.0990)	(0.134)	(0.134)	(0.133)	(0.133)
Cash	-1.617***	2.256***	2.482***	2.240***	2.454***
	(0.107)	(0.113)	(0.163)	(0.113)	(0.162)
Export	-0.192***	-0.0536	-0.127	-0.0558	0.113
	(0.0620)	(0.204)	(0.239)	(0.205)	(0.237)
Agricultural	0.217	-0.173	0.247	-0.177	0.218
	(0.368)	(0.262)	(0.202)	(0.265)	(0.202)
Borrower Characteristics					
ln(Size)		0.0267	0.0462	0.0285	0.0455
		(0.0465)	(0.0626)	(0.0469)	(0.0636)
Big City		0.395***	0.486***	0.470**	0.367*
		(0.126)	(0.143)	(0.183)	(0.198)
Bank Characteristics					
Government	0.353***	0.239*		0.229*	
	(0.115)	(0.124)		(0.128)	
Specialized	-0.505	-0.0259		-0.0512	
	(1.161)	(0.318)		(0.314)	
Foreign	-0.515	-0.855**		-0.847**	
	(0.360)	(0.337)		(0.337)	
Large	0.659***	0.823***		0.803***	
	(0.0967)	(0.158)		(0.152)	
Intercept		-7.145***	-5.799***	-7.141***	-6.010***
		(1.308)	(1.535)	(1.308)	(1.561)
Region dummies (7)	No	No	No	No	No
Industry Dummies (67)	No	Yes	Yes	Yes	Yes
Year*Month Fixed Effects	d(Quarter)	Yes	Yes	Yes	Yes
Borrower Fixed Effects	Yes	No	No	No	No
Bank Fixed Effects	No	No	Yes	No	Yes
Log Pseudolikelihood	-10,013	-21,928	-14,477	-21932	-14,554
α (Duration Dependence)	-	0.971	1.021	0.970	1.045
Chi^2(k) [LR in VI, VII, IX & XIII, Wald in others]	625.8	4,179***	6,268***	4,166.30***	6,529.89***
Number of regressors minus one (k)	15	116	122	116	122
Number of Loan-Months	603,677	578,809	369,816	579,144	370,063
Number of Loans	152,730	148,316	107,215	148,397	107,282
Number of Borrowers	22,723	21,574	15,144	21,586	15,153

***, **, * indicate significance at 1%, 5% and 10% level, two-tailed.

religious activity,[34] and/or (2) the identification of the borrower with Islamic tenets,[35] plays a role in explaining the lower hazard rate on Islamic loans, one would expect this differential between conventional and Islamic loans to widen during the holy Muslim month.[36] The estimated coefficient on the interaction between Islamic loan and *Ramadan* is indeed negative and sizeable, i.e., -0.696*, implying that during *Ramadan* months default on Islamic loans drops by more than half.

In case the network effect of religious activity plays a role, the location of the borrower (and/or the bank) may matter. In rural areas (and small towns) there may be more inherent social pressure to repay and more informal help from family and friends in case a borrower faces financial difficulties, and religious affiliation and practice may provide few or no extra network benefits. The distinction between religious and other political parties in rural areas and small towns may also be less acute than in big cities because rural dwellers may in general be more religious.

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[34] Prospective borrowers and loan officers may meet at mosques for example. Meetings there between loan officers may also function as an informal credit register (see Jappelli and Pagano (1993), Padilla and Pagano (1997), Bouckaert and Degryse (2006) and Brown, Jappelli et al. (2009) for example on the effects of formal credit registers). Using 1999 – 2003 data on the composition of the boards of directors of all firms in Pakistan, Khwaja, Mian et al. (2011) estimate the value of membership in the large yet diffuse network that links firms through interlocks for the access to bank credit and financial viability. The *common bond* present in credit unions around the world may fulfill a similar role (McKillop and Wilson (2011)). Ostergaard, Schindele et al. (2009) for example find that savings banks located in Norwegian communities with high *social capital* have a higher probability of survival and lower loan losses. Though they stress the role social capital plays in facilitating collective decision-making at the banks.

[35] Khan (2010) argues that "despite not providing an alternative to conventional banking and finance, Islamic banking and finance does strengthen a distinctly Islamic identity by providing the appropriate Islamic terminology for *de facto* conventional financial transactions."

[36] Ramadan is a fundamentally shared experience, both within the local community and with other Muslims across the world, and may hence result in both a (temporary) strengthening of local social networks and a surge in the identification with the Muslim world and its practices. Clingingsmith, Khwaja et al. (2009) show that identification with the global Muslim community may also strengthen following participation in the Hajj, but we lack individual Hajj participation data to test this conjecture in this context. Following Frieder and Subrahmanyam (2004), Bialkowski, Etebari et al. (2010) show that equity returns in 14 Muslim markets are substantially higher during Ramadan, while volatility is markedly lower. These findings can possibly be attributed to the sentiment of Islamic investors and their trades during this period.

We introduce a dummy variable *Big City* that equals one if borrower is located in a city with more than one million inhabitants and equals zero otherwise. To measure local religious fervency we rely on a variable *Share Religious Political Parties*, which equals the percentage of total votes obtained for National Assembly seats by the coalition of six religious-political parties in the General Elections of 2002 in the district where the borrower is located.[37]

We interact the Share variable with the Big City dummy. We expect that if the network effects of religion matter the hazard differential between Islamic and conventional loans will increase in the share of religious political parties in big cities (i.e., we expect the estimated coefficient on Islamic Loan * Share * Big City to be negative).[38]

We report the estimates with the Share of Religious Political Parties and Big City variables in Models II and III in Table 3.8. Notice that the sample now includes only those loans that are granted in the four provinces and the federal capital (i.e., regions where Pakistani political parties can operate) and exclude loans in other regions administered by Pakistan. The results are very interesting. The estimated coefficients in Model III (which includes bank fixed effects) for example suggest that in big cities: (1) the loan hazard rate is on average almost 50 percent higher than in rural areas (i.e., the coefficient on Big City equals 0.486***); (2) Islamic loans are relatively more likely to default than in rural areas (i.e., the coefficient on Islamic Loan * Big City equals 0.206, hence is positive and sizeable though not significant); and (3) Islamic loans are

[37] We use the poll results from the 2002 General Election because 5 of the 6 religious-political parties boycotted the 2008 edition.

[38] Borrower size may also be positively correlated with possible religious network effects. In various specifications we indeed find that the coefficient of our measure of borrower size interacted with the Islamic Loan dummy is negative, statistically significant, and economically sizable.

relatively less likely to default loans if the share of religious parties grows while this is not the case in rural areas (i.e., the coefficient on Islamic Loan * Share * Big City equals -0.170***, while the coefficient on Islamic Loan * Share equals 0.0429).

This evidence suggests that difference in loan performance of conventional and Islamic loans, especially among urban dwellers that in general may be less pious, may be explained by the network effect of religious activity.

In robustness we replace the Share of Religious Political Parties with *Religious School Enrollment* we glean from Andrabi, Das et al. (2006). They define this variable as the number of children enrolled in religious schools as a percentage of total school enrollments in each district (we use the mid-points for the ranges they report). Results (we do not tabulate) again suggest that network effects of religion play a role in determining the differential probability of conventional and Islamic loan repayment, though now the effect is more muted in big cities than in rural areas. Possibly the increased possibilities for pupils to commute in big cities may weaken the correspondence between this measure of local religiosity and the differential in hazard rates.[39]

In a recent study, Pepinsky (2010) argues that the demand for Islamic banking products is determined more by a quest by individuals to claim or maintain a Muslim identify, rather than by religiosity itself. The need for identification tends to be stronger for middle-class borrowers, who are more vulnerable to social dislocation problems induced by modernization and globalization, especially when located in a big city. We

[39] We further replace the Big City by the *Government Bank* dummy in all specifications but none of the coefficients on the interaction terms are statistically significant. This result suggests that the share of religious parties may not influence the loan officers at these government banks (that grant also Islamic loans) to be more lenient on these loans.

hypothesize that in particular these middle-class borrowers that look to strengthen their Muslim identify not only demand more Islamic banking products but also have a lower propensity to default on them, especially in big cities.

To test this conjecture, we introduce a variable *Share of Post-Natal Private Care* which equals the percentage of women that used private (and not public) hospitals or clinics for their post-natal care in the district of the borrower captures the local consumption of a luxury good by the middle class. Models IV and V feature this new *Share* variable and its interactions. The estimated coefficient on the triple interaction term (almost marginally significant, its p-value equals 0.104) suggests that in big cities Islamic loans are less likely to default than conventional loans if the share of post-natal private care grows.

In sum, the reported estimated correlations suggest that in addition to borrower, loan and/or bank loan characteristics, also religion may play some role in determining the differential repayment performance of conventional and Islamic loans, through individual piousness, network effects and maybe also group identification.

3.5 Conclusions

The hazard rate on Islamic loans is less than half the hazard rate on conventional loans, across many duration models we estimate using a comprehensive monthly dataset from Pakistan that follows more than 150,000 loans over the period 2006:04 to 2008:12. The specifications include a variety of loan contract, borrower, and bank characteristics, where possible combined with time, borrower, bank and/or borrower*bank fixed effects. During Ramadan and in big cities where religious parties poll well Islamic loans default less likely, suggesting that religious motivation may partly determine the differential loan default rates.

It is important to notice that our study does not aim to address the broader question if conventional or Islamic finance is "better" from either the borrower's, bank's or even society's perspective. Such individual, institutional and public welfare analyses would require for example the collection of detailed data on individual motivations for loan repayment and the aggregation at the bank level of micro-level data, not only on individual bank loans but also on deposits and other bank products, bank organization and processes etc. Nor does our study imply that similar effects could not be present among adherents to other religions or value systems. But studying the default rates on individual conventional and Islamic loans is a first and necessary step, however, in understanding how the specific arrangements in Islamic finance may, or may not, determine borrower loan repayment.

Appendix 3-A: Types of Islamic Products

This Appendix aims to provide a brief summary of the main issues in Islamic finance and the dominant types of Islamic products that are employed to finance small businesses. For more detail see Kettell (2010) for example.

Under Islamic economic philosophy, granting a loan is essentially a charitable activity and hence should occur without any compensation. The borrower may (and is encouraged to) voluntarily pay back more than the principal amount to show her/his gratitude towards lender, however, it is prohibited to make an agreement regarding any such additional payment.

If someone wants to earn profits from transferring money, then one must make an investment and share both in the risk and the return of the venture. The ideal modes of Islamic finance are thus *Musharakah* (partnership, where all partners invest both money and some or contribute their expertise) and *Mudarabah* (partnership with some partners investing only money and others only their skills/labor). Islamic banks, however, have devised a variety of other products that mimic the conventional banking products. Many of these products are based on sale contracts rather than loan contracts while others are based on rental contracts. Salient features of most widely used Islamic financial products are given below.

The first column lists the name of the Islamic banking product. The second column mentions the conventional (banking) product(s) that are similar to that particular Islamic product. The third column describes the way the product operates, the fourth column defines the default event and the last column describes the penalties in case of default.

Islamic Product	Conventional Equivalent	Operation	Default	Penalty in the Event of Default
Murabahah	Term loan (w/ balloon payment) installment loan (w/ bullet payments)	1. *Murabahah* is a kind of sale in which seller discloses cost to the buyer. 2. Bank and customer enter into a *Murabahah* agreement 3. The bank appoints the customer as its agent to purchase the asset and gives her/him money for that or the bank itself purchases the asset	Default occurs when the customer misses a payment. The facility is classified as non-performing when a payment is overdue by 90 days or more.	1. The bank cannot change the sales price once it is fixed. 2. To contain moral hazard on part of the customer regarding delayed payment or non-payment of any amount when it is due, the customer undertakes that s/he will give x% per annum of the overdue amount for the period of

Islamic Product	Conventional Equivalent	Operation	Default	Penalty in the Event of Default
		4. Under a separate contract, the bank sells that asset to the customer at a marked-up price 5. The customer pays the price in installments over a period of time or in lump sum at an agreed on date. Notes: Bank can appoint the customer as an agent to purchase the underlying asset on its behalf, but bank must retain the risk and return as the owner of the asset. Bank must own the asset before it could sell it. *Murabahah* cannot be used to finance commodities/assets already owned by the customer. Unlike a normal sale, the customer knows the cost and profit of the bank.		default to a charity fund managed by the bank. 3. Bank can approach a court to seek redressal, court may award solatium to the bank to cover the 'real losses' suffered like the cost of litigation. Real losses do not include time value of money.
Diminishing Musharakah	Hire-purchase, mortgage financing	1. Customer approaches the bank with a request to finance a fixed asset (say building). 2. Bank agrees to a joint ownership with the customer and agrees to finance say 80% of the value of the building, worth $10M.	Default occurs when the customer misses a payment. The facility is classified as non-performing when a	1. Bank cannot change the rent or sale price of its share in asset once it is fixed. 2. To contain moral hazard on part of customer regarding delayed payment or non-

Islamic Product	Conventional Equivalent	Operation	Default	Penalty in the Event of Default
		3. Bank pays $8M to seller, customer pays $2M to seller. 4. The bank divides its ownership in say 20 parts and the customer undertakes to purchase those parts at agreed dates. 5. The customer uses the building and pays rent to the bank for its 80% ownership in the building. 6. At agreed dates, the customer purchases the bank's shares in the building, the ownership in the building gradually transfers to the customers. 7. The bank's share in rent of the building decreases proportionally. Notes: The contract of joint ownership and the promise to purchase the shares in asset from bank cannot be made conditional on each other.	payment is overdue by 90 days or more. Breach of promise also occurs if the customer does not keep her/ his promise to purchase bank's share in asset.	payment of any amount when it is due, the customer undertakes that s/he will give x% per annum of the overdue amount for the period of default to a charity fund managed by the bank. 3. Bank can approach a court to seek redressal, court may award solatium to the bank to cover 'real losses' suffered by it like the cost of litigation. Real losses do not include time value of money.

Islamic Product	Conventional Equivalent	Operation	Default	Penalty in the Event of Default
		The promise to purchase bank's share is essentially a unilateral promise by the customer.		
Ijarah	Operating lease	1. It involves the transfer of usufruct but not ownership of the asset at an agreed rent. 2. Customer (lessee) approaches the bank (lessor) for lease of a specific asset and makes a promise to lease that asset. 3. The bank purchases the asset, or it may appoint customer to purchase the asset as its agent. 4. After acquisition, the bank rents the asset to the customer for a specific rent; rent may vary for different periods. 5. The customer pays the rent on agreed dates. Notes: Anything, which cannot be used without consuming, cannot be leased out, for example money, wheat etc. Bank retains the risks and rewards of the owner.	Default occurs when the lessee misses a payment. The facility is classified as non-performing when a payment is overdue by 90 days or more.	1. Bank cannot change the rent once it is fixed. 2. To contain moral hazard on part of customer regarding delayed payment or non-payment of any amount when it is due, the customer undertakes that s/he will give x% per annum of the overdue amount for the period of default to a charity fund managed by the bank. 3. Bank can approach a court to seek redressal, court may award solatium to the bank to cover 'real losses' suffered by it like the cost of litigation. Real losses do not include time value of money.

Islamic Product	Conventional Equivalent	Operation	Default	Penalty in the Event of Default
		Customer is responsible for the costs and benefits as the user of the asset The lease agreement can be terminated with the mutual consent of lessee and lessor or it can be terminated by lessor if the lessee contravenes any terms of lease.		
Ijarah wa' Iqtina	Financial lease	1. It involves transferring of usufruct of the asset, and at the end of lease period ownership of the asset also transfers to customer. 2. Customer (lessee) approaches the bank (lessor) for the lease of a specific asset and makes a promise to lease that asset. 3. The bank purchases the asset, or it may appoint customer to purchase the asset as its agent. 4. The bank makes a separate promise to give the asset to the lessee at the end of lease period as a gift or to sell the asset for a specific price. The promise must be unilateral i.e. not binding on lessee and it cannot be conditional on the lease contract.	Default occurs when the lessee misses a payment. The facility is classified as non-performing when a payment is overdue by 90 days or more.	1. Bank cannot change the rent or sale price of the asset once it is fixed. 2. To contain moral hazard on part of customer regarding delayed payment or non-payment of any amount when it is due, the customer undertakes that s/he will give x% per annum of the overdue amount for the period of default to a charity fund managed by the bank. 3. Bank can approach a court to seek redressal, court may award solatium to the bank to cover 'real losses' suffered by

Islamic Product	Conventional Equivalent	Operation	Default	Penalty in the Event of Default
		5. After acquisition, bank rents the asset to the customer for a specific rent; rent may vary for different periods. 6. The customer pays the rent on agreed dates. 7. At the end of the *Ijarah* period, the bank sells the asset to the customer or gives it away to customer as gift. Note: The contract of *Ijarah* cannot be conditional on signing the promise of sale or gift. The promise must be made separately.		it like the cost of litigation. Real losses do not include time value of money.
Istisna	In some aspects comparable to working capital finance	1. *Istisna'* is a sales transaction where a commodity is traded before it comes into existence. It is an order to a manufacturer to manufacture a specific commodity for the buyer. 2. The price can be paid in advance, in installments or at the time of delivery. 3. The bank and customer enter into an *Istisna* contract, bank orders the customer to manufacture specific goods.	Default occurs if customer fails to deliver specified goods in time. Default also occurs if the agent fails to perform her duties.	1. It is permissible for the bank and customer to agree that in the event of delay in delivery of goods the price will be reduced by a specific amount per day. 2. It is also permissible to change the price later because of force majeure.

Islamic Product	Conventional Equivalent	Operation	Default	Penalty in the Event of Default
		4. Bank can pay some or entire sum of the order in advance or in installments. 5. Customer manufactures the products and delivers them to the bank. The delivery can be constructive. 6. Bank appoints the customer (or anyone else) as its agent to sell the manufactured goods for cash or credit and receives the proceeds. 7. The agent is entitled to agency fees for services. Note: The customer can utilize the amount paid by bank for any purpose.		
Salam		1. In *Salam*, the seller undertakes to supply specific goods to the buyer at a future date in exchange of a price fully paid in advance. 2. Bank enters in a *Salam* contract with customer and pays the price for goods to be delivered at a later date.	Default occurs, if the customer fails to perform her obligations under the contract. Any misrepresentation by the customer is also construed as an event	

Islamic Product	Conventional Equivalent	Operation	Default	Penalty in the Event of Default
		3. With the same delivery date bank enters into a parallel *Salam* with another customer to sell the goods that it expects to receive under the first *Salam* contract. 4. Alternatively bank can obtain a promise from another potential buyer of the goods that the bank expects to receive under *Salam*. The bank can then sell the products for cash when it receives them. 5. The price under two *Salam* contracts or the first *Salam* and purchase promise can be different and that difference is profit of the bank. Notes: Engineering a buyback agreement using parallel *Salam* is not permissible, i.e., the seller under first *Salam* cannot be buyer under the second *Salam* contract The two *Salam* contract are distinct from each other and cannot be made conditional on one another. Bank can ask for security or guarantee to ensure performance on part of its customer	of default.	

Islamic Product	Conventional Equivalent	Operation	Default	Penalty in the Event of Default
Musharakah	Joint venture	1. *Musharakah* is a relationship between two parties or more, who contribute capital to a business, and divide the net profit and loss. All providers of capital are entitled to participate in management, but not necessarily required to do so. The profit is distributed among the partners in pre-agreed ratios, while the loss is borne by each partner strictly in proportion to respective capital contributions. 2. Bank and customer enter into a *Musharaka* agreement by investing a certain sum of capital in the business for a specified period of time. 3. Bank and customer also define the share of each party in expected profits. The customer also gives an (annual) projection of profit. 4. The customer periodically (monthly/ quarterly) pays the profit to the bank based on the profit projections and bank's share in profit. 5. These profit payments are provisional and	Default occurs if the customer fails to make profit or capital payments when they are due. The facility is classified as non-performing when a payment is overdue by 90 days or more.	1. If the business suffers losses, then bank assumes the losses in proportion to its investment. 2. To contain moral hazard on part of customer regarding delayed payment or non-payment of any amount when it is due, the customer undertakes that s/he will give x% per annum of the overdue amount for the period of default to a charity fund managed by the bank. 3. Bank can approach a court to seek redressal, court may award solatium to the bank to cover 'real losses' suffered by it like the cost of litigation. Real losses do not include time value of money.

Islamic Product	Conventional Equivalent	Operation	Default	Penalty in the Event of Default
		are subject to upward or downward adjustments based on the realized profits/losses. 6. At the end of *Musharaka* contract, customer pays back the capital of the bank net of profits/losses. Notes: Return can be fixed as a percentage of profit but not as a percentage of investment. Share of an active partner in profit can be more than her/his contribution to capital. A sleeping partner cannot share in profit more than her/his share is capital. Loss is always shared proportional to the invested capital.		
Mudaraba	Similar to hedge / mutual funds	1. *Mudaraba* is a kind of partnership between two parties, where one party (or parties-financiers) provides finances and the other (entrepreneur) provides expertise, labor and management. Profits made are shared between the financier and the entrepreneur according to a predetermined ratio. In the event of loss, the financier absorbs all losses, while the entrepreneur loses her/his provision of	Default occurs if the customer fails to make payments to the bank when they become due under the agreement or when customer fails to render her/his duties as agent of the bank to manage the affairs of	1. If the customer (agent) acts negligently to run the affairs of the business and business suffers loss because of negligence then bank can deny payment of compensation(for management and labor) to the customer.

Islamic Product	Conventional Equivalent	Operation	Default	Penalty in the Event of Default
		labor 2. Bank and customer enter into a *Mudaraba* agreement, whereby the bank invests *all* the required capital and the customer commits his skills/management. 3. Bank and customer also define their shares in expected profits. 4. The customer periodically (monthly/ quarterly) pays the profit to the bank as agreed between the two. 7. At the end of *Mudaraba* contract, the *Mudaraba* can be dissolved or extended. In case of dissolution, the customer pays back the principal net of any accrued profits or losses. Notes: Return can be fixed as a percentage of profit but not as a percentage of investment. Losses are always absorbed by the financier(s)/bank.	the business. The facility is classified as non-performing when a payment is overdue by 90 days or more.	2. The bank can also take over the business and terminate the right of the customer to look after it if the customer contravenes any terms of *Mudaraba* agreement. 3. The customer is liable for the loss if it is proven that s/he has breached her/his obligations.

Islamic Product	Conventional Equivalent	Operation	Default	Penalty in the Event of Default
Qard-e-Hasna	Benevolent Loan	1. The borrower approaches the bank for financing. 2. The bank agrees to give loan to customer for a certain period, to be paid back in installments or in one go. 3. Bank can charge service fee, and documentation charges. 4. Bank cannot claim any other interest or profits for time value of money.	Default occurs when the customer fails to pay an amount when it is due. The facility is classified as non-performing when a payment is overdue by 90 days or more.	1. Bank cannot any additional amount in the event of default by the borrower. 2. To contain moral hazard on part of customer regarding delayed payment or non-payment of any amount when it is due, the customer undertakes that s/he will give x% per annum of the overdue amount for the period of default to a charity fund managed by the bank. 3. Bank can approach a court to seek redressal, court may award solatium to the bank to cover 'real losses' suffered by it like the cost of litigation. Real losses do not include time value of money.

Appendix 3-B: Banks

The appendix reports the banks by type (and which therefore may appear in more than one category).

Banks
Islamic Banks
Albaraka Islamic Bank B.S.C. (E.C.)
Meezan Bank Ltd.
Dubai Islamic Bank Pakistan Ltd.
BankIslami Pakistan Limited
Emirates Global Islamic Bank
Dawood Islamic Bank Ltd.
Government Banks
The Bank of Khyber
The Bank of Punjab
First Women Bank Limited
National Bank of Pakistan
Specialized Banks
IDPB (industrial development)
Punjab Provincial Cooperative Bank Ltd.
SME Bank
ZTBL (agricultural development)
Foreign Banks
Albaraka Islamic Bank B.S.C. (E.C.)
Barclays Bank Plc
Citi Bank N.A.
Deutsche Bank A.G.
Hong Kong & Shanghai Banking Corporation
Oman International Bank S.A.O.G.
The Bank of Tokyo-Mitsubishi Ltd.
Large Banks
Bank Alfalah Limited
Habib Bank Limited
MCB Bannk Limited
National Bank of Pakistan
United Bank Limited
Banks with Both Islamic and Conventional Loans
Askari Commercial Bank Limited
Bank Alfalah Limited
Bank Al-Habib Limited
Bank of Khyber
Habib Bank Limited
Habib-Metropolital Bank Limited
MCB Bannk Limited
National Bank of Pakistan
Royal Bank of Scotland (Formerly ABN Amro Bank NV)
Soneri Bank Limited
Standard Chartered Bank Limited
United Bank Limited
All Other Banks (Smaller Private Domestic Banks Offering only Conventional Loans)
Allied Bank Limited
Arif Habib Rupali Bank Limited
Atlas Bank Limited
Crescent Commercial Bank Limited
Faysal Bank Limited
JS Bank Limited
KASB Bank Limited
Mybank Limited
NIB Bank Ltd
Saudi Pak Commercial Bank Limited
Soneri Bank Limited

Appendix 3-C: Regions and Industries

The appendix reports the names of the regions and industries.

Regions
Province of Punjab
Province of Sindh
North-Western Frontier Province (renamed as Khyber Pakhtoonkhwa in 2010)
Province of Baluchistan
Federal Capital Area
(Pakistan Administered) Azad Kashmir
Federally Administered Tribal Area
Federally Administered Northern Area (Gilgit Baltistan as of 29 August 2009)
Industries (Sectors)
Agriculture, hunting and forestry - Others
Commerce and Trade- Retail trade
Commerce and Trade- Sale, maintenance and repair of motor vehicles and motor cycles
Commerce and Trade- Wholesales and commission trade
Construction- Buildings
Construction- Infrastructure
Education
Electricity, gas and water supply
Fishing, farming, aquaculture and related service activities
Foreign constituents
Health and social work
Hotels, restaurants and clubs
Insurance
Manufacturing- Basic metals
Manufacturing- Chemicals and chemical products
Manufacturing- Electrical machinery and apparatus
Manufacturing- Fabricated metal products
Manufacturing- Furniture and fixture
Manufacturing- Handicrafts
Manufacturing- Jewellery and related articles
Manufacturing- Machinery and equipments
Manufacturing- Medical, precision and optical instruments, watches and clocks
Manufacturing- Motor vehicles, trailers and semi - trailers
Manufacturing- Office, accounting and computing machinery
Manufacturing- Other sectors
Manufacturing- Other non - metallic mineral products
Manufacturing- Other transport equipment
Manufacturing- Petroleum products
Manufacturing- Radio, television and communication equipments and apparatus
Manufacturing- Rubber and plastic products
Manufacturing- Sport goods
Manufacturing- Food products
Manufacturing- Papers, paper boards and products
Manufacturing- Printing, publishing and allied industries
Manufacturing- Tanning and dressing of leather
Manufacturing- Textiles- Weaving
Manufacturing- Textiles- Spinning
Manufacturing- Textiles- Finishing
Manufacturing- Textiles- Made-up
Manufacturing- Textiles- Knitwear
Manufacturing- Textiles- Carpets and rugs
Manufacturing- Textiles- Wearing apparel, ready made garments and dressing
Manufacturing- Textiles- Other
Manufacturing- Tobacco
Manufacturing- Wood products
Mining and quarrying
Other community, social and personal service activities
Other service sectors
Real estate, renting and business activities
Ship breaking
Transport, storage and communications
Trust funds and non-profit organizations
Trading
Petroleum
Beverages
Cement
Telecommunication
Surgical and medical instruments
Footware
Sugar
Oil and gas expolaration
Power generation
Refinaries
Fertilizers
Agriculture- Rice
Agriculture- Raw cotton
Agriculture- Wheat
Miscellaneous Industries

Appendix 3-D: Penalties at the Conventional and Islamic Branches of Various Mixed Banks

The table reports the penalties by loan type at the conventional and Islamic branches of various mixed banks as reported on their websites in March 2011. All amounts are in PKR.

Bank	*Branch*	Car Loan	Home Loan	Credit Card
Alhabib	*Conventional*	500/installment & check return charges of 500*	400/installment & check return charges of 500	
	Islamic	N/a	N/a	
Askari	*Conventional*	3% of amount due & check return charges of 500*	750/installment & check return charges of 500	
	Islamic	No	No	
Bank Alfalah	*Conventional*	Min. per installment: 100/day or 1,000/month	Per installment (for loans up to 1 million): 500/month [for average loan around 8% on unpaid amount]	
	Islamic	No	Regular rent on unpaid amount	
Bank of Khyber	*Conventional*	As per sanction letter & check return charges of 500*	as per sanction letter & check return charges of 500*	
	Islamic	No	No	
Habib Bank	*Conventional*	600/month	600/month	
	Islamic	No	No	
UBL	*Conventional*	1,000/month unless contract stipulates differently	1,000 unless contract stipulates differently	
	Islamic	Max. 20%/year of the amount due [for a Toyota Corolla, 5 year financing, 0% equity around 550/month]	N/a	
Royal Bank of Scotland (merged into Faysal Bank as of 01-Jan-2011; its schedule applies)	*Conventional*	600/installment, collection charges of 465/visit & check return charges as per schedule (0 in the reference schedule of charges)	higher of 1,000 or 10% of amount due, collection charges 475/visit & check return charges as per schedule (0 in the reference schedule of charges)	
	Islamic	Same as above	Same as above	
Soneri	*Conventional*	500/month for all products		
	Islamic	Per agreement		
Standard Chartered	*Conventional*	Up to 1,000	Up to 1,000	higher of up to 1,500 or 10% of amount due
	Islamic	Up to 1,000	Up to 1,000 & 2% pro month on amount due	No

Max.= Maximum. Min.= Minimum. No = not mentioned in the schedule of charges; The bank cannot charge anything unless a clause in the individual loan contract mentions a penalty. N/a= We could not track the penalty schedule, or it is not available. *= The bank receives undated checks from the borrower with the amount of an installment and when the customer misses an installment payment submits the check.

Appendix 3-E: Religiosity and Loan Default: An Illustration

Let x be the degree of religiosity of a business owner that borrows from a bank. When $x = 0$ the borrower is secular, when $x = 1$ the borrower is a devout Muslim.

Both the probability the borrower takes a conventional loan and the probability the borrower defaults on a loan likely decrease in the degree of religiosity. The motivation for these two assumptions is straightforward. Islamic finance finds its existence and inspiration in the principles of Islamic law so a more devout Muslim is more likely to take an Islamic loan than a conventional loan. In addition, Islamic principles forbid "eating" other people's money in an unlawful way, hence a more devout Muslim is less likely to default on a loan.

Given these two assumptions, Islamic loans will less likely default than conventional loans. As an illustration assume for example that x is the probability that a borrower obtains an Islamic loan and $1 - x$ the probability that a borrower takes a conventional loan, and that the probability of default on a loan equals $p(1 + p - x)$, which is a decreasing function of the religiosity of the person, with p some value for which $0 < p < 1$ and $0 < p(1 + p) < 1$.

Borrowers of equal religiosity x that are granted either an Islamic or a conventional loan are equally likely to default on these loans. Yet, if borrowers are uniformly distributed (in x on (0,1)) and each take one loan, then the probability of default across all granted Islamic loans equals $\int_0^1 xp(1 + p - x)dx = \frac{p}{2}(\frac{1}{3} + p)$, while the probability of default on all granted conventional loans equals $\int_0^1 (1 - x)p(1 + p - x)dx = \frac{p}{2}\left(\frac{2}{3} + p\right)$. Hence the ratio of the default probability across all Islamic versus conventional loans equals that we would observe equals: $\frac{\frac{1}{3}+p}{\frac{2}{3}+p} < 1$. For $p = \frac{1}{2}$ this ratio equals $\frac{5}{7}$ for example.

Borrowers may also take two loans. With probability x^2 both loans are Islamic and with probability $(1 - x)^2$ both loans are conventional. With probability $2x(1 - x)$ one loan is Islamic and the other loan is conventional, a probability which is at its maximum for $x = \frac{1}{2}$, that is for borrowers of an intermediate religiosity.

If a borrower takes one Islamic and one conventional loan the probability the borrower defaults on the Islamic loan likely decreases in his religiosity while a secular borrower is likely to be indifferent. This assumption is motivated by our prior that a borrower who has both types of loans and is a more devout Muslim will feel a more acute conflict with his religious beliefs when defaulting on an Islamic loan than when defaulting on a conventional loan. For example the probability a person defaults on the Islamic loan rather than on the conventional loan when the borrower has two different loans may equal $\frac{1-x}{2}$. The borrower then defaults on the conventional loan with probability $\frac{1+x}{2}$.

For borrowers with one Islamic and one conventional loan, the default ratio of the Islamic over the conventional loan, i.e., $\frac{1-x}{1+x}$, decreases in their religiosity x. In addition, if borrowers are again uniformly distributed (in x on (0,1)) and each take two loans, then the probability of default across <u>all</u> granted Islamic loans for those borrowers that mix equals $\int_0^1 2x(1-x)\left(\frac{1}{2}\right)(1-x)\ (p(1+p-x)dx$, while probability of default on <u>all</u> conventional loans for those borrowers that mix equals $\int_0^1 2x(1-x)\left(\frac{1}{2}\right)(1+x)\ (p(1+p-x)dx$. The ratio of these two probabilities equals $\frac{1}{3}$, which is smaller than the equivalent ratio across one-loan borrowers in our example.

In sum, if increasing religiosity <u>decreases the probability the borrower</u>: (a) takes a conventional loan rather than an Islamic loan, (b) defaults on a loan, and (c) defaults on the Islamic rather than on the conventional loan (if both an Islamic and conventional loan are taken), then:

(1) *Islamic loans are on average less likely to default than conventional loans.*

(2) *Intermediate religiosity is more likely to result in a conventional and Islamic loan being taken.*

(3) *The ratio of the Islamic over conventional loan default probabilities for two-loan borrowers is smaller than for one-loan borrowers.*

Notice that implication (1) pertains to all observed loans (that are studied in models without borrower fixed effects), while implication (3) is for those loans that are granted to borrowers that take multiple loans (comprising those that are retained in the borrower and bank*borrower fixed effects models).

4

Financial Reforms and Monetary Policy Transmission in Sub-Saharan Africa[40]

4.1 Introduction

One of the key elements in the transmission mechanism of monetary policy is the degree and speed at which changes in the short-term policy rates or money market rates are translated into retail interest rates. An important factor that may influence how policy stimuli are reflected in market reaction is the financial structure of an economy.

Impact of financial structure on dissemination and effectiveness of monetary policy is largely understudied. Especially little empirical evidence is available for the impact of financial structure on transmission mechanism of monetary policy in Sub-Saharan Africa (SSA). Moreover, the literature that addresses the linkage between transmission of monetary policy and financial structure treats financial structure in a given economy as static, whereas, financial structure does evolve over time with the ongoing financial reforms.

[40] This paper was written during my stay at International Monetary Fund (IMF) the views expressed in this paper are strictly mine and do not necessarily represent those of the IMF or IMF policy

Purpose of this chapter is to study the evolution of interest rate pass-through in selected Sub-Saharan African countries over a period of time to find out if ongoing financial reforms affect interest rate pass-through in the region.

This is a highly relevant policy issue for SSA countries as these countries have been going through costly financial reforms for quite some time so it is crucial to know if these ongoing reforms have any effect on the transmission of monetary policy in these countries.

For this chapter, I limit the study of transmission mechanism to interest rate pass-through and do not study other channels of monetary policy transmission. I follow a simple approach in the spirit of Cottarelli and Kourelis (1994). In first step, I calculate impact and long run multipliers for 16 SSA countries using rolling regressions. In the second step, I explain the cross country differences in impact multipliers by regressing them on several indicators of financial reforms using the database constructed by Abiad, Detragiache et al. (2008) .

The empirical results suggest that (a) in all SSA countries, save South Africa and Swaziland, interest rate pass-through is weak both in terms of initial and long run responses and pass-through is not static over time, (b) major differences in pass-through in different countries exist in the sample, and (c) financial reforms positively affect interest rate pass-through albeit with a lag.

Rest of the chapter is organized as follows. Section I documents the relevant literature. Section II discusses the data and econometric model, Section III analyses the results and Section IV offers some conclusions.

4.2 Literature Review

4.2.1 Monetary Policy and its Transmission:

The role of monetary policy has been extensively debated in literature(Milton (1968)). There is a general consensus that goals of monetary policy are stable prices, high employment and

rapid growth. Economists also generally agree that monetary policy affects inflation. They also acknowledge its impact on the short term economic activity but reject any role in the long term growth (Freixas and Rochet (1997)).

To achieve the goals of monetary policy, central banks use intermediate operating targets that can be measured with relative ease and swiftness. Several studies suggest that small changes in short term interest rates may lead to large changes in output (Bernanke and Gertler (1995), Bernanke, Gertler et al. (1996) and Hubbard (1995)), therefore, this intermediate target is often money market interest rate. The money market interest rates are targeted assuming that they would eventually lead to achieve the monetary policy objectives through channels of monetary policy transmission (Espinosa-Vega and Rebucci (2003)).

There is some variation in the classification of these channels, however, these are generally identified as interest rate channel, bank lending channel, balance sheet channel, asset price channel, exchange rate channel, and expectation channel (see Mishkin (1996) for details).

For effective transmission of monetary policy, interest rate channel is crucial. (Bifang-Frisancho, Mariscal et al. (2002) and Isakova (2008)). Borio and Fritz (1995) contend that besides bank lending rates, bank deposit rates are also important as they influence the consumption and saving decisions. Most of the literature on the transmission mechanism of monetary policy assumes that changes in the money market interest rates are immediately and completely passed through to the retail banking rates.(Espinosa-Vega and Rebucci (2003)). I discuss more about this assumption in the next subsection.

4.2.2 Interest Rate Stickiness:

In contrast with the theoretical assumption of frictionless interest rate pass-through, several empirical studies document that pass-through of money market rates to the retail rates is

neither complete nor instant. Hannan and Berger (1991), Berger and Udell (1992), Neumark and Sharpe (1992) and Lowe and Rohling (1992) were among the first to document stickiness of retail interest rates. Berger and Udell (1992) show that lending rates are sticky with respect to changes in t-bill rates, Hannan and Berger (1991) demonstrate that this stickiness increases with market concentration, and Neumark and Sharpe (1992) provide evidence that deposit rates show varying degree of stickiness for increase or decrease in t-bill rates.

This stickiness of retail bank rates has been given several justifications in the literature. Lowe and Rohling (1992) postulate that explanations of stickiness of prices in goods markets also hold true for financial markets. Mester and Saunders (1995) argue that a rise in interest rates deteriorate the average creditworthiness of borrowers, therefore, banks prefer not to pass on all changes in market interest rates to their borrowers. Fried and Howitt (1980) on the other hand argue that borrowers may be more risk averse than shareholders of a bank. Being risk averse, they prefer stable interest rate payments. To satisfy risk adverse customers, the bank charges a less variable interest rate and is compensated by a higher interest rate. A weak interest rate pass-through may also emanate from high administrative costs of adjustments (Hannan and Berger (1991), and Hofmann and Mizen (2004)).

In a cross country setting, Cottarelli and Kourelis (1994) argue that the banking industry face adjustment costs when interest rates change. A profit-maximizing bank will only change the lending rate if the adjustment costs are lower than maintaining status quo. They further argue that several structural parameters determine the adjustment mechanism, for example degree of competition, entry barriers, restrictions on international capital flows and access to alternative sources of finances are some of the factors that determine the degree of stickiness.

Several other studies also attempt to relate financial structure to the transmission of monetary policy. Cottarelli, Ferri et al. (1995) postulate that the within Italy, the differences in the

degree of lending rate stickiness among Italian banks can be explained by differences in concentration of banks' local markets, their ownership structure and size. For old European Union(EU) countries, Cecchetti (1999) concludes that legal and financial structure influence the transmission of monetary policy. On the other hand Elbourne and de Haan (2006) do not find link between financial structure indicators and monetary policy in new EU countries.

On another dimension, besides Cottarelli and Kourelis (1994), other papers that study interest rate pass-through in cross-country setting, for example Borio and Fritz (1995), and Mojon (2000) report heterogeneity in the pass-through in different countries. Mojon (2000) also reports that for both lending and deposit, competition from direct finance increases the pass-through. Thus, the literature suggests that differences in financial structure can be an important source of varying degree of interest rate pass-through.

4.3 Data and Methodology

4.3.1 Impact and Long Run Multipliers

For this chapter, I follow the approach used by Cottarelli and Kourelis (1994) and Mojon (2000). Employing a two-step regression approach, in the first step, I measure the degree of stickiness of the retail lending or deposit rates as compared to the changes in the money market rates (or t-bill rates) for each of the selected countries. Specifically, I estimate the following regression:

$$i_{i,t} = \beta_{i,0} + \beta_{i,1} i_{i,t-1} + \beta_{i,2} m_{i,t} + \ldots + \beta_{i,n+2} m_{i,t-n} + u_{i,t}; \qquad (1)$$

where, $i_{i,t}$ and $m_{i,t}$ are respectively the retail rates (lending or deposit rates) and wholesale rates (money market or t-bill rates) for country *i* at time *t*.

As mentioned in introduction, one purpose of this chapter is to study the evolution of interest rate pass-through over time. To this end, I employ rolling regressions following Toolsema (2002). The notion behind rolling regressions is using a fixed 'n' number of observations

from the total available N observations (n$\in$ N) to estimate the model and then re-estimating the model every time dropping the first observation while adding an additional observation at the end.

For estimations, I use a rolling window of 48 months, and use Akaike Information Criteria (AIC) to determine lag length from the full sample and then apply the same lag for each rolling window regression[41]. Since the interest rate time series are non-stationary, therefore, I estimate equation (1) in first differences.

For each country and for each estimation window, I use coefficients from equation (1) to calculate impact multiplier - a measure of stickiness, and long run multiplier as follows:

$$\text{Impact Multiplier} = IM_{i,t,x} = \beta_2 ; \qquad (2)$$

$$\text{Long Run Multiplier} = LM_{i,t,x} = \frac{1}{1-\beta_1} \sum_{j=0}^{n} \beta_{2+j} ; \qquad (3)$$

where $x_{i,l}$ is the multiplier for country *i* for rolling period *t* and interest rate type *x* (lending or deposit).

4.3.2 Interest Rate Pass-through, Financial Structure and Financial Reforms

In the second step, using general indicators of economic and financial development and also several indicators of financial reforms from the data base constructed by Abiad, Detragiache

[41] As an alternate, Schwarz Information Criterion (SIC) was also used to determine lag length. The multipliers calculated using either AIC or SIC were highly correlated with each other (correlation coefficient is between .70 and .94), therefore, these results are not further reported or used. Moreover, in another set of regressions to calculate impact and long run multipliers, I independently determine lag length for each of the rolling window regressions, that is, if there are 204 months corresponding to 156 rolling windows of 48-months each, then for each of the 156 regressions, lag length was independently determined using AIC. An Eviews program written to do that automatically is given in Appendix-1 and the plot of Impact and Long-run multipliers so calculated are given in Appendix-2.

et al. (2008), I explain time varying cross country impact multiplier by using the following regression:

$$IM_{i,t,x} = Z_{i,t}\gamma + \delta DepositDummy + v_{i,t}; \qquad (4)$$

where, $Z_{i,t}$ is a matrix of indicators of general economic and financial development and a set financial reforms at time t for country i. *DepositDummy* signifies if the impact multiplier is for deposit rate or lending rate, it takes the value of 1 for impact multipliers for deposit rates and 0 otherwise. For estimations, I use both a financial reform index and several parameters of financial reforms as defined in the data sub-section.

The dependent variable in equation (4) is not observed, rather it is estimated, therefore, least square estimation might be inefficient. To account for this, following Saxonhouse (1976), I use weighted least square estimates where inverse of the standard error of impact multipliers is used as weights.

Further, I calculate the impact multiplier at monthly frequency, whereas, indicators of economic and financial development and data of financial reforms is available at an annual frequency, therefore, some form of aggregation of dependent variable is necessary. Following the practices in literature, I use two approaches, firstly estimating equation (4) using the impact multiplier for the month of June-only for respective year of explanatory variables (economic and financial indicators and financial reform data); and secondly aggregating impact multiplier using its annual average. It may be noted that the matching of impact multipliers and explanatory variables is still approximate at the best, because the monthly impact multiplier is calculated by using data of 48 preceding months.

4.3.3 Data

To estimate the equation (1) defined in methodology, I use monthly data for interest rates

(money market rates, t-bill rates, lending rates, and discount rates) obtained from IFS. High frequency data is important because time aggregation may bias the results. Primarily, I use money market rates as a measure of market rates but if money market rates are not available then I use t-bill rates as their proxy. I use 16 SSA countries for which relevant data was available. The sample period spans from 1990:01 to 2009:12. The countries that are analyzed and the specific retail and market rates used for each country are listed Table 4.1. Summary statistics of the interest rate data are given in Table 4.2. From the table it is apparent that interest rates have been very high in SSA over the sample period.

In the second step, to estimate equation (4), I use some general economic and financial indicators and financial reform database constructed by Abiad, Detragiache et al. (2008). This data is available for only 8 of the 16 countries used in estimations in first step and it does not cover period after 2005. Summary statistics of this data are presented in Table 4.2, which show a low average rating of Financial Reform Index. A brief account of the variables that are used in regressions is given below:

4.3.3.1 GDP Per Capita:

The GDP Per Capita is a broad measure of economic development of a country. Higher level of per capita GDP corresponds to higher degree of economic development. It can also be interpreted as a crude measure of financial development because of its high correlation with financial assets to GDP ratio (Cottarelli and Lourelis(1994)) This measure is taken from World Development Indicators maintained by World Bank and is defined as GDP divided by midyear population.GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets

Table 4.1: List of Countries and Rates

This table lists the SSA countries used in the analysis, the retail rate used for these countries, whether t-bill rate or money market rate is used as a market rate and the sample period for the countries

Country	Retail Rate	Market/ Policy Rate	Period
Burundi	Lending	T-Bill Rate	1990M01 - 2006M12
Ghana	Deposit	Money Market Rate	2003M04 - 2009M12
Kenya	Deposit & Lending	T-Bill Rate	1990M01 - 2009M12
Mauritius	Deposit & Lending	Money Market Rate	1990M01 - 2009M12
Mozambique	Deposit & Lending	Money Market Rate	1998M05 - 2009M12
Namibia	Deposit & Lending	Money Market Rate	1991M09 - 2009M12
Nigeria	Deposit & Lending	T-Bill Rate	1990M01 - 2009M12
Rwanda	Deposit & Lending	Money Market Rate	1996M09 - 2009M01
Seychelles	Deposit & Lending	T-Bill Rate	1990M01 - 2009M12
SierraLeone	Deposit & Lending	T-Bill Rate	1990M01 - 2008M12
SouthAfrica	Deposit & Lending	Money Market Rate	1990M01 - 2009M12
Swaziland	Deposit & Lending	Money Market Rate	1990M01 - 2009M12
Tanzania	Deposit & Lending	T-Bill Rate	1994M09 - 2009M12
Uganda	Deposit & Lending	T-Bill Rate	1990M01 - 2002M11
Zambia	Deposit & Lending	T-Bill Rate	1990M01 - 2002M11
Zimbabwe	Deposit & Lending	T-Bill Rate	1990M01 - 2002M11

Table 4.2: Summary Statistics for Interest Rates

This table presents the summary statistics for the interest rate series of the SSA countries used in the analysis. All numbers are in percentages

Country	Retail Rate	Mean	Std. Dev	Median	Min	Max
Burundi	Lending Rate	15.805	2.191	15.610	10.990	20.510
	T-Bill / Money Market Rate	11.000	3.774	10.030	4.000	19.610
Ghana	Lending Rate	20.996	8.925	20.560	7.250	36.210
	T-Bill / Money Market Rate	16.101	4.975	15.480	8.120	28.250
Kenya	Lending Rate	9.138	5.245	6.250	2.020	21.450
	Deposit Rate	21.399	7.546	19.300	11.970	38.550
	T-Bill / Money Market Rate	15.508	12.867	12.886	0.830	84.670
Mauritius	Lending Rate	10.036	1.713	9.750	6.250	13.750
	Deposit Rate	20.006	1.775	21.000	15.000	23.550
	T-Bill / Money Market Rate	7.781	3.243	8.105	1.000	13.400
Mozambique	Lending Rate	15.447	9.964	11.196	6.966	42.400
	Deposit Rate	21.177	3.676	19.838	14.824	33.500
	T-Bill / Money Market Rate	13.561	5.665	12.835	4.520	31.440
Namibia	Lending Rate	9.189	2.506	8.845	5.110	14.650
	Deposit Rate	16.051	3.826	15.525	9.750	24.840
	T-Bill / Money Market Rate	10.913	3.284	10.145	6.450	20.510
Nigeria	Lending Rate	13.656	3.882	13.130	5.080	27.000
	Deposit Rate	20.679	3.885	20.100	10.040	37.800
	T-Bill / Money Market Rate	13.416	5.216	12.650	2.000	27.500
Rwanda	Lending Rate	8.492	1.541	8.750	5.000	11.400
	Deposit Rate	16.223	1.519	16.205	12.000	19.000
	T-Bill / Money Market Rate	9.039	1.755	9.000	2.280	15.800
Seychelles	Lending Rate	13.049	2.542	12.760	9.671	16.550
	Deposit Rate	8.347	4.331	5.244	2.380	18.980
SierraLeone	Lending Rate	16.530	14.682	10.000	5.130	70.600
	Deposit Rate	31.459	13.290	25.000	20.000	73.500
	T-Bill / Money Market Rate	26.334	17.591	20.365	3.800	95.200
SouthAfrica	Lending Rate	11.663	3.709	11.230	5.870	21.600
	Deposit Rate	16.062	3.589	15.500	10.500	25.500
	T-Bill / Money Market Rate	11.815	3.800	11.095	6.430	21.250
Swaziland	Lending Rate	8.102	2.515	8.000	3.890	13.430
	Deposit Rate	14.838	2.769	14.500	10.000	21.000
	T-Bill / Money Market Rate	7.667	2.527	7.940	3.360	12.130
Tanzania	Lending Rate	9.165	6.097	7.640	2.452	27.000
	Deposit Rate	22.766	8.987	20.550	13.282	48.000
	T-Bill / Money Market Rate	12.318	10.387	9.700	2.500	62.300
Uganda	Lending Rate	15.312	10.203	11.180	3.540	39.000
	Deposit Rate	25.050	7.263	21.440	17.144	40.000
	T-Bill / Money Market Rate	17.304	12.485	11.390	2.969	43.500
Zambia	Lending Rate	34.220	20.074	26.000	11.400	111.000
	Deposit Rate	51.549	22.700	45.700	27.700	139.300
	T-Bill / Money Market Rate	46.734	31.179	36.952	17.333	177.680
Zimbabwe	Lending Rate	24.949	11.275	24.380	8.250	54.000
	Deposit Rate	35.305	15.029	34.760	11.500	71.250
	T-Bill / Money Market Rate	29.251	15.055	27.300	7.740	69.410

Table 4.3: Summary Statistics of Financial Reform Parameters

This table presents the summary statistics for the financial reform index, its different paremeters, and measures of eonomic and financial development indicators. The financial reform index is normalized between 0 and 1, whereas other parameters are coded to take a value between 0 and 3 with 0 being most repressed and 3 being fully liberalized

						Real GDP in USD 100
Country	**Indicator**	**Mean**	**Std. Dev**	**Median**	**Min**	**Max**
Ghana	Normalized Financial Reform Index	0.42	0.08	0.43	0.33	0.57
	Directed Credit	1.13	0.35	1.00	1.00	2.00
	Credit Controls	1.13	0.35	1.00	1.00	2.00
	Interest Rate Controls	3.00	0.00	3.00	3.00	3.00
	Bank Entry Barriers	1.07	0.26	1.00	1.00	2.00
	Banking Supervision	0.47	0.74	0.00	0.00	2.00
	Privatization	0.67	0.49	1.00	0.00	1.00
	International Capital Flows	1.00	0.00	1.00	1.00	1.00
	Security Markets	1.53	0.52	2.00	1.00	2.00
	(Market Capitalization + Total Credit)/ GDP	0.45	0.18	0.43	0.24	0.85
	Real GDP (PPP)	3.64	0.67	3.77	2.55	4.89
	Inflation	0.26	0.15	0.25	0.12	0.59
Kenya	Normalized Financial Reform Index	0.59	0.14	0.64	0.36	0.74
	Directed Credit	1.00	0.00	1.00	1.00	1.00
	Credit Ceilings	0.93	0.26	1.00	0.00	1.00
	Credit Controls	1.45	0.19	1.50	0.75	1.50
	Interest Rate Controls	3.00	0.00	3.00	3.00	3.00
	Bank Entry Barriers	2.40	0.91	3.00	1.00	3.00
	Banking Supervision	0.60	0.51	1.00	0.00	1.00
	Privatization	1.67	0.49	2.00	1.00	2.00
	International Capital Flows	2.07	1.10	2.00	0.00	3.00
	Security Markets	1.20	0.41	1.00	1.00	2.00
	(Market Capitalization + Total Credit)/ GDP	0.29	0.17	0.23	0.13	0.72
	Real GDP (PPP)	4.16	0.67	4.23	2.68	5.23
	Inflation	0.09	0.07	0.09	0.02	0.29
Mozambique	Normalized Financial Reform Index	0.53	0.24	0.68	0.05	0.71
	Directed Credit	2.20	1.08	3.00	0.00	3.00
	Credit Ceilings	0.47	0.52	0.00	0.00	1.00
	Credit Controls	2.00	1.12	2.25	0.00	3.00
	Interest Rate Controls	2.40	1.24	3.00	0.00	3.00
	Bank Entry Barriers	2.73	0.70	3.00	1.00	3.00
	Banking Supervision	0.73	0.46	1.00	0.00	1.00
	Privatization	1.93	1.44	3.00	0.00	3.00
	International Capital Flows	0.87	0.35	1.00	0.00	1.00
	Security Markets	0.53	0.52	1.00	0.00	1.00
	Lending Rate	9.19	2.51	8.85	5.11	14.65
	Deposit Rate	16.05	3.83	15.53	9.75	24.84
	T-Bill / Money Market Rate	10.91	3.28	10.15	6.45	20.51
	(Market Capitalization + Total Credit)/ GDP	0.21	0.22	0.13	0.01	0.63
	Real GDP (PPP)	2.24	0.50	2.27	1.40	3.16
	Inflation	0.12	0.04	0.13	0.07	0.17
Nigeria	Normalized Financial Reform Index	0.67	0.15	0.67	0.46	0.86
	Directed Credit	2.13	0.92	2.00	1.00	3.00
	Credit Ceilings	0.67	0.49	1.00	0.00	1.00
	Credit Controls	2.10	1.03	2.25	0.75	3.00
	Interest Rate Controls	2.07	1.03	2.00	0.00	3.00
	Bank Entry Barriers	3.00	0.00	3.00	3.00	3.00
	Banking Supervision	1.47	0.52	1.00	1.00	2.00
	Privatization	2.53	0.52	3.00	2.00	3.00
	International Capital Flows	0.40	0.51	0.00	0.00	1.00
	Security Markets	2.40	0.51	2.00	2.00	3.00
	Lending Rate	8.49	1.54	8.75	5.00	11.40
	Deposit Rate	16.22	1.52	16.21	12.00	19.00
	T-Bill / Money Market Rate	9.04	1.76	9.00	2.28	15.80
	(Market Capitalization + Total Credit)/ GDP	0.34	0.21	0.29	0.15	0.80
	Real GDP (PPP)	3.99	1.73	3.40	2.20	7.97
	Inflation	0.19	0.19	0.14	0.07	0.73

contd.

Table 4.3: Summary Statistics of Financial Reform Parameters

Country	Retail Rate	Mean	Std. Dev	Median	Min	Max
South Africa	Normalized Financial Reform Index	0.78	0.13	0.82	0.54	0.87
	Directed Credit	3.00	0.00	3.00	3.00	3.00
	Credit Ceilings	0.00	0.00	0.00	0.00	0.00
	Credit Controls	2.25	0.00	2.25	2.25	2.25
	Interest Rate Controls	3.00	0.00	3.00	3.00	3.00
	Bank Entry Barriers	2.60	0.83	3.00	1.00	3.00
	Banking Supervision	1.40	0.51	1.00	1.00	2.00
	Privatization	3.00	0.00	3.00	3.00	3.00
	International Capital Flows	2.33	1.18	3.00	0.00	3.00
	Security Markets	1.73	0.46	2.00	1.00	2.00
	Lending Rate	8.10	2.52	8.00	3.89	13.43
	Deposit Rate	14.84	2.77	14.50	10.00	21.00
	T-Bill / Money Market Rate	7.67	2.53	7.94	3.36	12.13
	(Market Capitalization + Total Credit)/ GDP	1.76	0.31	1.75	1.24	2.32
	Real GDP (PPP)	35.52	7.94	35.70	24.40	52.35
	Inflation	0.06	0.02	0.06	0.01	0.09
Tanzania	Normalized Financial Reform Index	0.59	0.21	0.62	0.19	0.81
	Directed Credit	2.47	1.13	3.00	0.00	3.00
	Credit Ceilings	0.67	0.49	1.00	0.00	1.00
	Credit Controls	2.35	1.13	3.00	0.00	3.00
	Interest Rate Controls	2.73	0.70	3.00	1.00	3.00
	Bank Entry Barriers	3.00	0.00	3.00	3.00	3.00
	Banking Supervision	1.27	0.88	2.00	0.00	2.00
	Privatization	0.80	1.01	0.00	0.00	2.00
	International Capital Flows	1.13	0.64	1.00	0.00	2.00
	Security Markets	1.13	0.64	1.00	0.00	2.00
	Lending Rate	15.31	10.20	11.18	3.54	39.00
	Deposit Rate	25.05	7.26	21.44	17.14	40.00
	T-Bill / Money Market Rate	17.30	12.48	11.39	2.97	43.50
	(Market Capitalization + Total Credit)/ GDP	15.23	8.26	11.41	8.21	34.08
	Real GDP (PPP)	2.81	0.66	3.03	1.60	3.73
	Inflation	0.13	0.10	0.07	0.05	0.34
Uganda	Normalized Financial Reform Index	0.01	0.00	0.01	0.00	0.01
	Directed Credit	1.00	0.00	1.00	1.00	1.00
	Credit Ceilings	1.00	0.00	1.00	1.00	1.00
	Credit Controls	1.50	0.00	1.50	1.50	1.50
	Interest Rate Controls	2.53	0.99	3.00	0.00	3.00
	Bank Entry Barriers	3.00	0.00	3.00	3.00	3.00
	Banking Supervision	1.13	0.83	1.00	0.00	3.00
	Privatization	1.53	1.19	2.00	0.00	3.00
	International Capital Flows	1.67	1.18	1.00	0.00	3.00
	Security Markets	0.87	0.35	1.00	0.00	1.00
	Lending Rate	34.22	20.07	26.00	11.40	111.00
	Deposit Rate	51.55	22.70	45.70	27.70	139.30
	T-Bill / Money Market Rate	46.73	31.18	36.95	17.33	177.68
	(Market Capitalization + Total Credit)/ GDP	0.06	0.03	0.06	0.00	0.10
	Real GDP (PPP)	2.62	0.00	0.03	1.97	3.14
	Inflation	0.05	0.00	0.00	0.00	0.10
Zimbabwe	Normalized Financial Reform Index	0.56	0.09	0.56	0.37	0.65
	Directed Credit	0.47	0.52	0.00	0.00	1.00
	Credit Ceilings	0.73	0.46	1.00	0.00	1.00
	Credit Controls	0.90	0.31	0.75	0.75	1.50
	Interest Rate Controls	2.80	0.41	3.00	2.00	3.00
	Bank Entry Barriers	1.53	1.06	1.00	0.00	3.00
	Banking Supervision	0.20	0.41	0.00	0.00	1.00
	Privatization	2.60	0.51	3.00	2.00	3.00
	International Capital Flows	1.87	1.36	3.00	0.00	3.00
	Security Markets	1.87	0.35	2.00	1.00	2.00
	(Market Capitalization + Total Credit)/ GDP	1.84	1.66	0.94	0.42	5.20
	Real GDP (PPP)	5.52	0.91	5.36	4.48	7.18
	Inflation	0.50	0.40	0.32	0.19	1.40

or for depletion and degradation of natural resources. Data are in current 100s of U.S. dollars.

4.3.3.2 Market Capitalization plus Credit to GDP:

Stock market capitalization to GDP ratio is an indicator of the role of stock market in financing the enterprises in an economy, whereas the credit to GDP ratio is an indicator of the size of banking sector. I use a combination of these two ratios, that is, market capitalization plus credit to GDP ratio as an indicator of the size and importance of financial system in an economy relative to its GDP. This indicator is thought to be important as the relative size of the financial system is expected to influence the speed of interest rate pass-through in an economy. The data used to construct this measure is gleaned from World Development Indicators.

4.3.3.3 Inflation:

GDP deflator data taken from World Development Indicators is used as a measure of inflation. This variable is important to explain interest rate pass-through as it is expected that in countries with high inflation the adjustment lags of nominal variables is likely to be shorter (Cecchetti(1986)).

4.3.3.4 Directed Credit:

Directed credit captures credit controls and excessively high reserve requirements. Countries are rated on a scale of 0 to 3, 0 being highest degree of repression and 3 being full liberalization.

4.3.3.5 Credit Ceilings:

Credit ceilings refer to the ceilings set by government on overall credit extended by banks, or on credit to specific sectors. Countries are rated on a scale of 0 to 3, 0 being the

highest degree of repression and 3 being full liberalization.

4.3.3.6 Interest Rate Controls:

This is one of the most common forms of financial repression whereby government specifies both lending and deposit rates by setting ceilings or floors tight enough to be binding in most circumstances. Interest rate controls increase the stickiness of retail rates. Countries are rated on a scale of 0 to 3, 0 being the highest degree of controls and 3 being full liberalization.

4.3.3.7 Entry Barriers:

To maintain control over credit allocation, government may restrict the entry into the financial system of new domestic banks or of other potential competitors, for example foreign banks or non-bank financial intermediaries. Entry barriers may take the form of outright restrictions on the participation of foreign banks; restrictions on the scope of banks' activities; restrictions on the geographic area where banks can operate; or excessively restrictive licensing requirements. On this parameter, countries are rated on a scale of 0 to 3, with 0 being most restrictive policies and 3 being most liberalized.

4.3.3.8 Banking Supervision:

Banking supervision captures prudential regulations and supervision of the banking sector. For this variable a high degree of governmental intervention is coded as a reform, that is, countries with best supervision of banks are rated 3 and with worst supervision 0.

4.3.3.9 Privatization:

Privatization refers to the share of private sector in the ownership of banking sector. Ownership of banks is the most direct form of control a government can have over credit allocation and it adversely affects the interest rate pass-through. Countries with excessive

government ownership are rated 0 and with least government ownership are rated 3.

4.3.3.10 International Capital Flows:

International capital flows describe the restrictions imposed on international financial transactions. Such restrictions give governments greater control over credit and exchange rates. Again, countries are rated on a scale of 0 to 3, with 3 being most liberal capital flow policies and 0 being the highest degree of restriction on capital flows.

4.3.3.11 Securities Markets:

A well functioning securities market is instrumental to the efficient pass-through of interest rates. Countries with policies that best encourage the development of securities markets are rated at 3 while the countries with policies aimed to restrict securities markets are rated 0 on a scale of 0 to 3.

4.3.3.12 Financial Reforms Index:

Financial Reforms Index is sum of the scores achieved by countries on the above parameters listed from 4. to 12; it is then normalized to be between 0 and 1.

4.4 Empirical Results

4.4.1 Impact and Long-Run Multipliers

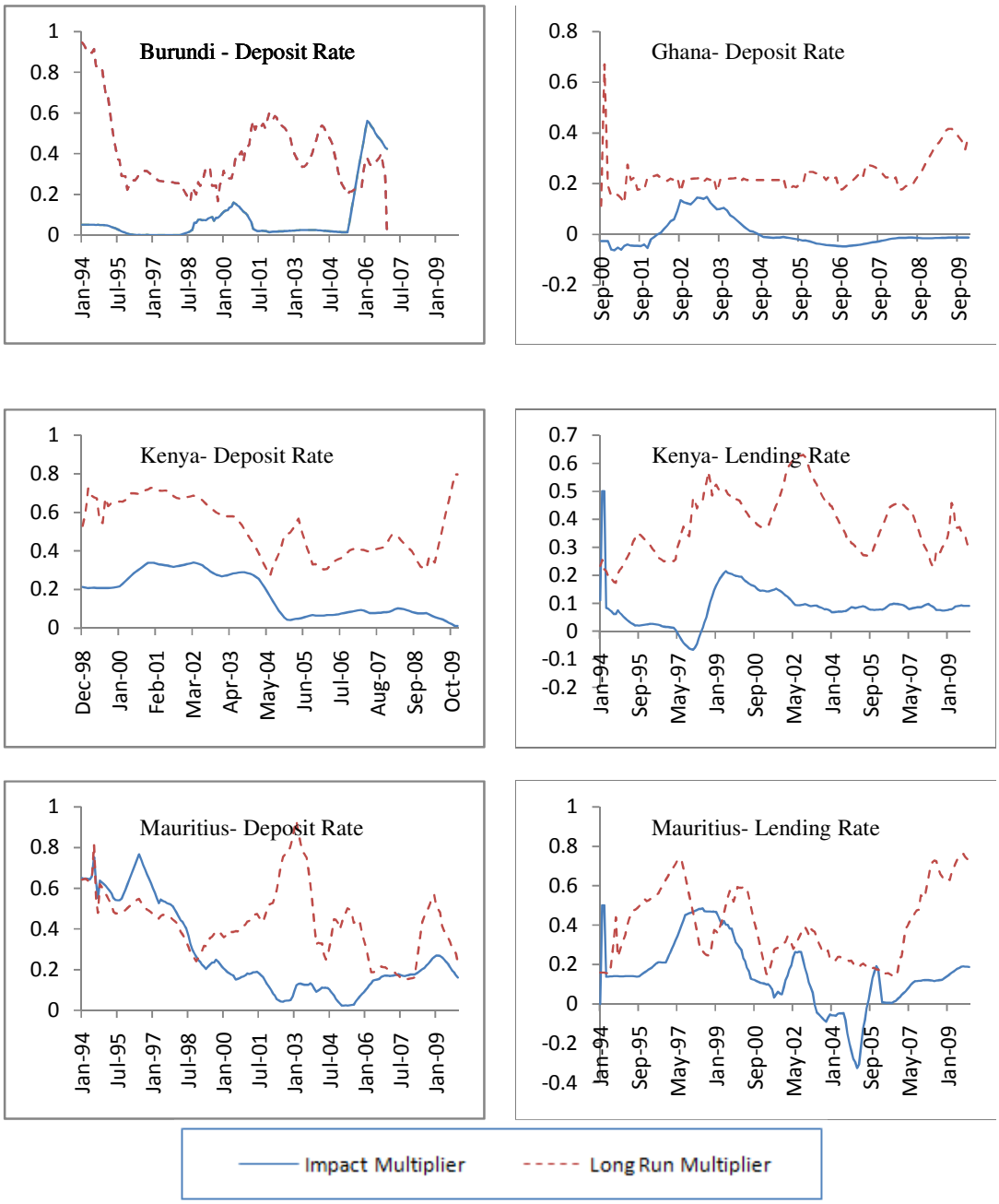
The graphs for impact and long-run multipliers for the SSA countries under study are presented in Figures 4.1– 4.29.

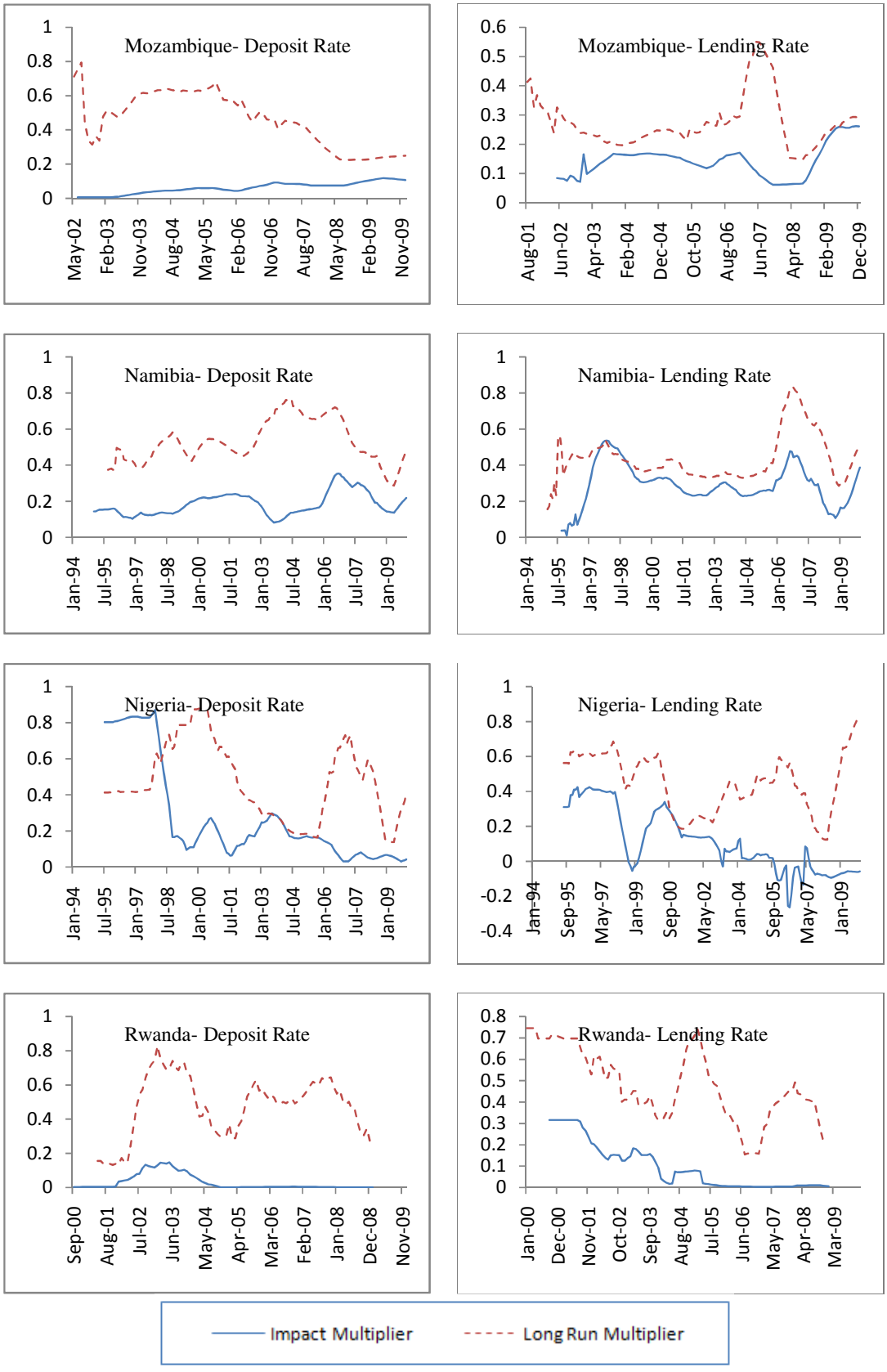
The results show that on average both the impact and long run multipliers are low and pass-thorough is weak in both short run and long run, although the long run pass-through appears to be higher on average. The cross country impact multiplier averages around 0.259 and the long run multiplier averages around 0.458 which is far less than complete pass-through. It means that to effect a 100 basis point change in retail rates, the monetary

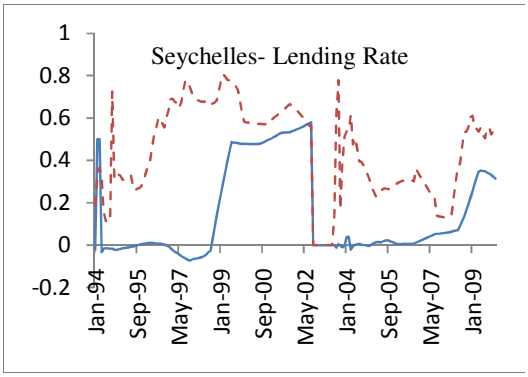
authorities on average need to change the policy rates or influence money market rates by 386 basis points. Given that the SSA countries are amongst the poorest countries in the world with rudimentary financial structure and systems, these results were not unexpected.

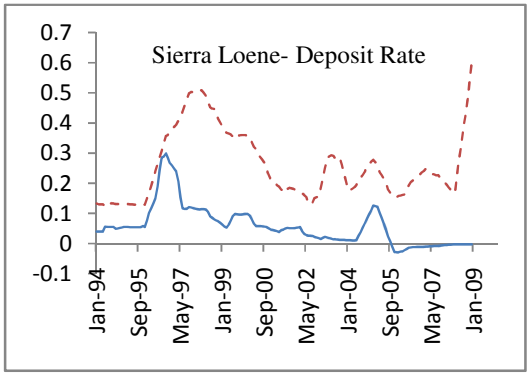
The results also show that, there is a great degree of variability within SSA countries, some countries notably South Africa and Swaziland have high impact and long-run multipliers with almost complete pass-through of market rates to the retail rates for both lending and deposit rates. At the start of the sample period both of these countries have had modest impact and long-run multipliers that evolved together over time. This shows convergence in the transmission mechanism of monetary policy for these two countries. This convergence and co-evolution is, however, not a surprise as Swaziland pegs its currency with South African Rand and does not follow an independent monetary policy. On the other hand countries like, Nigeria, Sierra Leone, Uganda, Tanzania, Rwanda, Mozambique, Ghana, Burundi have very low level of instant pass-through, it appears that for these countries the retail markets and money markets are disconnected and the retail interest rates are set independent of the market or policy rates. This is also not a surprising finding for countries with thin financial markets and financial repression as evident from low ratings on several parameters of financial reforms given in Table 4.3. From the above mentioned figures, it is visible that both impact and long run multiplier

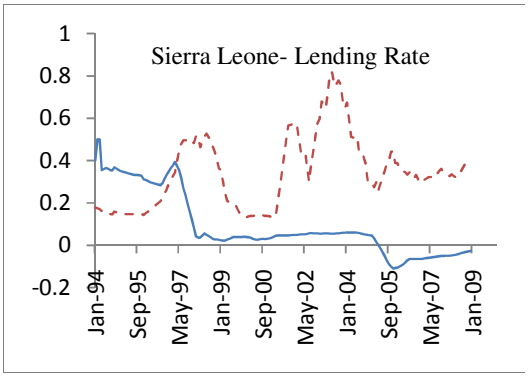
Figures 4.1 – 4.29
Evolution of Impact and Long Run Multipliers




Mozambique- Deposit Rate
Mozambique- Lending Rate
Namibia- Deposit Rate
Namibia- Lending Rate
Nigeria- Deposit Rate
Nigeria- Lending Rate
Rwanda- Deposit Rate
Rwanda- Lending Rate
Impact Multiplier
Long Run Multiplier


Seychelles- Lending Rate
1
0.8
0.6
0.4
0.2
0
-0.2
Jan-94
Sep-95
May-97
Jan-99
Sep-00
May-02
Jan-04
Sep-05
May-07
Jan-09


Sierra Loene- Deposit Rate
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-0.1
Jan-94
Sep-95
May-97
Jan-99
Sep-00
May-02
Jan-04
Sep-05
May-07
Jan-09


Sierra Leone- Lending Rate
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0.8
0.6
0.4
0.2
0
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Jan-94
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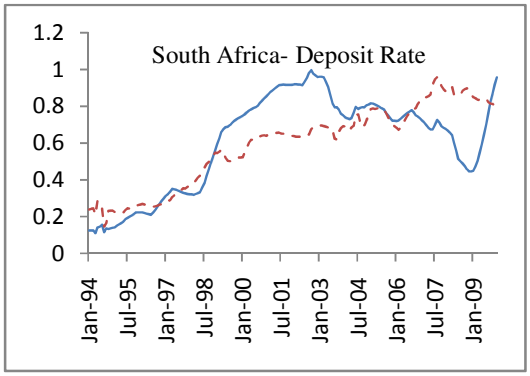
Jan-09


South Africa- Deposit Rate
1.2
1
0.8
0.6
0.4
0.2
0
Jan-94
Jul-95
Jan-97
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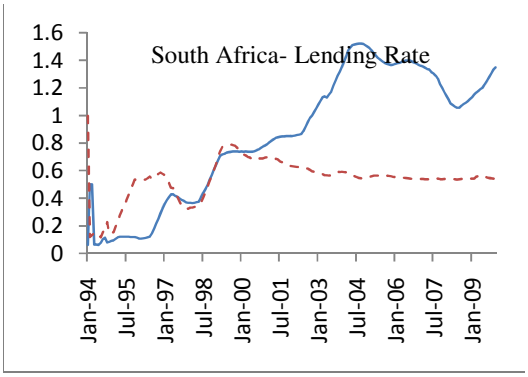
South Africa- Lending Rate
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
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Jan-94
Jul-95
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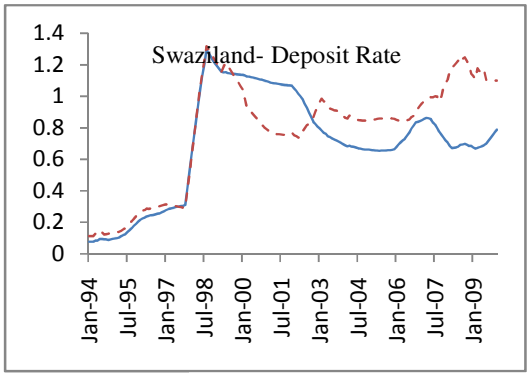
Swaziland- Deposit Rate
1.4
1.2
1
0.8
0.6
0.4
0.2
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Jan-94
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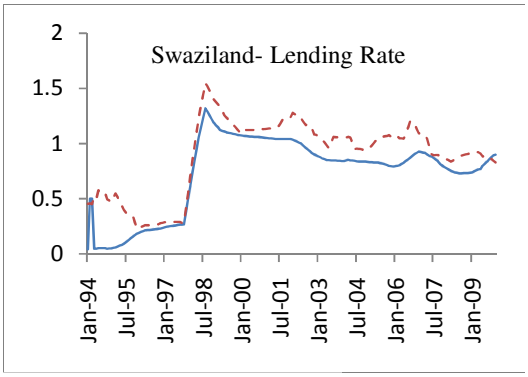
Swaziland- Lending Rate
2
1.5
1
0.5
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Jul-95
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Jul-04
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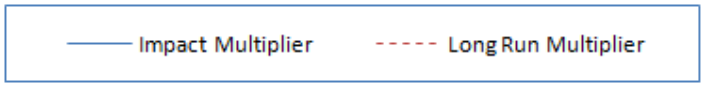
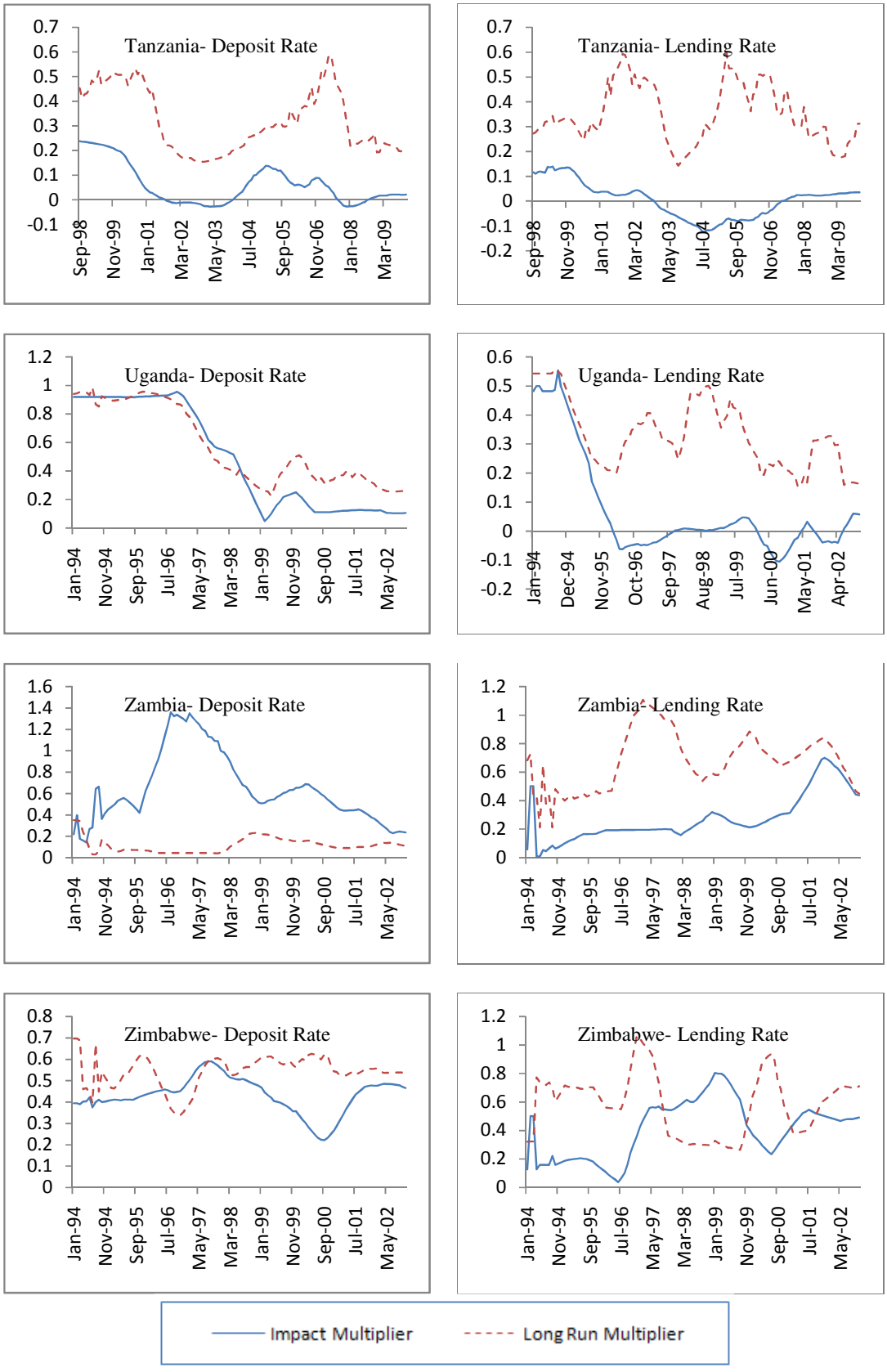
Jul-07
Jan-09


Impact Multiplier
Long Run Multiplier


Tanzania- Deposit Rate
Tanzania- Lending Rate
Uganda- Deposit Rate
Uganda- Lending Rate
Zambia- Deposit Rate
Zambia- Lending Rate
Zimbabwe- Deposit Rate
Zimbabwe- Lending Rate
Impact Multiplier
Long Run Multiplier

are not static for these countries as well and considerably change over time though these changes are not unidirectional. Given the small number of countries in the sample, there is not enough degree of freedom to formally relate the cross country variation in interest rate pass-through (impact or long run multipliers) to the indicators of economic and financial development. However, careful examination suggests that higher impact and long run multipliers correspond to relatively more developed economy.

4.4.2 Financial Reforms and Transmission of Monetary Policy

Table 4.4, reports the results of equation (4) that relates time varying cross country differences in impact multiplier to different parameters of financial reforms. The results are discussed below:

4.4.2.1 Impact Multipliers and Financial Reform Index:

I start with a basic model by regressing impact multiplier on financial reforms index, its lagged value and a dummy variable *DepositDummy* that identifies if the impact multiplier is for deposit rate or lending rate. The results show that financial reforms leading to higher degree of financial liberalization positively affect short run interest rate pass-through. However this affect is not instant and it appears to affect only after a time lag. This result holds after controlling for country fixed effects. The result also holds for alternative aggregation methods for dependent variable, that is when annual average of impact multiplier is used or when mid-year (June) impact multiplier is used. One standard deviation improvement in financial reform index leads on average to a faster adjustment by almost 2 basis points (7% faster adjustment).

Table 4.4: Estimation Results

This table reports least square estimates of regression of Impact Multiplier over index of Financial Reforms, its several components and general indicators of economic and financial development. In Columns I-VI, the Impact Multipliers for the month of June are used as dependent variable, whereas in Columns VII to VIII, dependent variable is the annual average of monthly Impact Multipliers. The heteroskedistic consistent standard errors are reported in parenthesis

VARIABLES	I	II	III	IV	V	VI	VII	VIII
Financial Reforms	-0.101	-0.117						
	(0.123)	(0.135)						
Financial Reforms(-1)		0.231**						
		0.099						
Directed Credit			0.045	0.035	0.044	0.034	0.019	0.011
			(0.042)	(0.046)	(0.050)	(0.023)	(0.025)	(0.010)
Credit Ceilings			0.037	0.039	0.051	0.061	0.061	0.051
			(0.046)	(0.051)	(0.047)	(0.056)	(0.042)	(0.048)
Interest Rate Controls			0.046*	0.058*	0.012	0.013	0.010	0.023
			(0.025)	(0.034)	0.014	0.017	0.014	0.030
Entry Barriers			-0.095	-0.082	-0.073	-0.066	-0.077	-0.065
			(0.088)	(0.056)	(0.068)	(0.078)	(0.101)	(0.083)
Banking Supervision			0.055	0.047	0.063	0.053	0.071	0.062
			(0.051)	(0.043)	(0.082)	(0.063)	(0.066)	(0.081)
Privatization			0.091**	0.071**	0.045*	0.039*	0.035*	0.036*
			(0.041)	(0.031)	(0.026)	(0.023)	(0.020)	(0.020)
International Capital Flows			-0.130	-0.123	-0.100	-0.025	-0.029	-0.029
			(0.162)	(0.084)	(0.130)	(0.023)	(0.038)	(0.022)
Security Markets			0.036	0.026	0.037	0.024	0.033	0.029
			(0.033)	(0.034)	(0.044)	(0.016)	(0.022)	(0.022)
Market Capitalization + Credit/ GDP			0.073	0.147	0.091	0.083	0.082	0.093
			(0.095)	(0.174)	(0.071)	(0.123)	(0.099)	(0.064)
Per Capita GDP			(0.013)	(0.023)	0.034	0.057*	0.048	0.056*
			(0.016)	(0.016)	(0.023)	0.035	(0.071)	0.032
Inflation			0.061**	0.052**	0.051*	0.045*	0.056*	0.051*
			(0.026)	(0.025)	(0.028)	(0.025)	(0.034)	(0.028)
Directed Credit(-1)					-0.053*	-0.048	-0.056*	-0.056*
					(0.030)	(0.037)	(0.030)	(0.031)
Credit Ceilings(-1)					-0.219	-0.126	-0.091	-0.098
					(0.117)	(0.086)	(0.061)	(0.067)
Interest Rate Controls(-1)					0.070*	0.062*	0.052*	0.061*
					(0.038)	(0.034)	(0.029)	(0.036)
Entry Barriers(-1)					-0.047	-0.072	-0.047	-0.065
					(0.032)	(0.049)	(0.031)	(0.124)
Banking Supervision(-1)					0.057*	0.047	0.056	0.051
					(0.032)	(0.090)	(0.039)	(0.035)
Privatization(-1)					0.052	0.045	0.046	0.047
					(0.037)	(0.042)	(0.032)	(0.032)
International Capital Flows(-1)					-0.068*	-0.038	-0.041	-0.054*
					(0.041)	(0.035)	(0.079)	(0.032)
Security Markets(-1)					0.065*	0.063*	0.061	0.071*
					(0.039)	(0.037)	(0.058)	(0.042)
DepositDummy	0.033**		0.031*		0.022*		0.045**	
	(0.014)		(0.019)		(0.013)		(0.023)	
Intercept	0.295***	0.153***	0.110**	0.113***	0.133***	0.112***	0.107***	0.104**
	0.099	0.052	0.056	0.040	0.048	0.039	0.038	0.050
Country Fixed Effects	No	Yes	No	Yes	No	Yes	No	Yes
Observations	107	106	101	101	100	100	100	100
Adj. R-squared	0.152	0.335	0.387	0.574	0.498	0.787	0.437	0.703

*** p<0.01, ** p<0.05, * p<0.1

In model with fixed effects, intercept is the average of fixed effects

4.4.2.2 Type of Retail Rates:

In all these specifications the coefficient on the dummy variable *DepositDummy* is positive and significant, which signifies that in the sample the deposit rates adjust faster than the lending rates. On average the impact multiplier for deposit rates is 2 to 4 basis points higher than same for lending rates. One explanation for this phenomenon could be that the demand deposits can be swiftly withdrawn and deposited elsewhere during the periods of interest rate increases, whereas, the banks may be more sluggish in changing the interest rates for existing loans or new loans of existing borrowers.

4.4.2.3 Directed Credit:

Directed credits are often required to be given at subsidized rates, therefore, presence of directed credit is expected to have a negative bearing on the interest rate pass-through. The coefficients of the current values of the directed credit are statically not significant. However, the coefficients of the lagged value of this variable are significant and surprisingly negative suggesting that removal of directed credit leads to worsening of interest rate pass-through in the next period. Specifically, a one notch improvement in this indicator results in slower adjustment of retail interest rates by 5 basis points. This suggests that elimination of directed credit does not necessarily improve the interest rate pass-through, and other accompanying reforms may be needed to deliver a positive result.

4.4.2.4 Interest Rate Controls

When using interest rate controls as a tool, the monetary authorities either specify a very narrow band of floors and ceilings that are so tight that it effectively fixes the interest rates or the authorities may allow the rates to fluctuate within broader bands. Since, interest rate controls are direct ways of controlling the retail rates therefore any change in

this control regime is expected to affect the interest rate pass-through instantly. The results tabulated in Table 4.4 attests this conjecture. A one notch improvement in this measure, for example, a change from fully repressed regime where retail interest rates are set by the government to a regime where retail rates are allowed to hover within a band, results in an improvement of interest rate pass-through by around 5 basis points or about 18% faster adjustment on average. The effect of change in interest rate control regime is even steeper after a time lag, when financial institutions have time to respond to the change in regime, one period lagged effect of this change by one notch is as much as 7% that translates into 26% better pass-through to retail rates or improvement in impact multiplier

4.4.2.5 Privatization

State ownership is a direct way of controlling the bank credit and is a common phenomenon in SSA and other less developed countries. The state controlled bank may not necessarily adjust their retail interest rates in response to changes in the market interest rates. In the regression results the coefficients on the current value of the variable privatization are positive and significant, whereas, the coefficients of the lagged values of this variable are statistically not significant. A plausible explanation might be that the process of privatization takes time thus already giving enough time to relevant institutions to adjust their operations, therefore, lagged values of this variable are less important. A one notch change in the value of this variable, for example, from fully repressed (50%-100% state ownership) to partially liberalized (25%-50% state ownership) results in 4 to 9 basis point or 15%-34% improvement in the impact multiplier on average.

4.4.2.6 International Capital Flows:

The coefficient on this variable is negative though statistically insignificant in most of the specifications. This result is not surprising, given that the ability of central bank to conduct monetary policy depends on the commercial bank's need for the liquidity provided by the central bank. If the international capital flows are liberalized then banks may fulfill their liquidity needs from abroad and thus may respond less to interest rate changes in domestic markets. The results indicate that a one notch liberalization of international capital flows (for example, from restrictions on capital outflows to minimal approval requirements for such outflows) results in about 5 basis point decrease in the impact multiplier.

4.4.2.7 Securities Markets:

The results given in Table 4.4 suggest that development in securities markets positively affect the interest rate pass-through, but this affects shows up only after a lag. A one notch improvement in securities market (for example, tax exemptions or introduction of long term government bonds) in the previous period results in an increase of about 6 to 7 basis points (22% - 26%) in the impact multiplier.

4.4.2.8 Inflation:

The results showt that the speed of adjustment of retail rates to the money market rates is better in inflationary environments. This results is similar to the one reported by Cecchetti(1986) and Cottarelli and Kourelis (1994), but the economic effect is much smaller in my results. A 20% (about one standard deviation) change in inflation translates into a change in impact multiplier by a little more than 1 basis point on average.

I do not further discuss the results for other variables that were not significant in the entire set of regressions. In a nut shell the results reported in Table 4.4, show that although some parameters affect the interest rate pass-through rather instantly, but most of the affect appears after a time lag. It cannot be ruled out that the instant effect of some reforms might actually be coming from the 'announcement effect' of the resolve of the relevant authorities to implement those reforms. Among all the parameters, changes in interest rate control regimes, abolishment of directed credit, privatization of state owned banks, development of security markets and inflationary environment appear to have a more consistent positive impact on interest rate pass-through. The results remain largely robust to alternative aggregation methods as explained before. These results should be interpreted with caution because the temporal match between dependent variable and explanatory variables is not perfect. As mentioned in the methodology section, I relate impact multipliers, calculated over a 48-month window, to financial reforms data for a specific year.

4.5 Conclusions

This chapter studies the evolution of interest rate pass-through in select Sub-Saharan African countries over a period of time to identify if the ongoing financial reforms affect the interest rate pass-through in the region.

This issue is highly relevant for SSA as in most of the SSA countries, financial structures are underdeveloped with thin securities markets, lack of domestic credit and inefficiencies in banking systems. These countries have been going through financial reforms for quite some time so it is crucial to evaluate if these ongoing reforms have any effect on the transmission of monetary policy in these countries.

The empirical results suggest that in all SSA countries, save South Africa and Swaziland, the interest rate pass-through is weak both in terms of initial and long run responses and pass-through is not static over time, major differences in pass-through in different countries exist in the sample, and financial reforms positively affect interest rate pass-through albeit with a lag.

These results suggest that financial reforms may help in the efficient conduct of monetary policy especially so if a country wishes to use indirect instruments of monetary policy. The results of such reforms may take some time to show up and the impact of different facets of reforms may differ, both in magnitude and in timing of results as well.

Appendix – 4-A

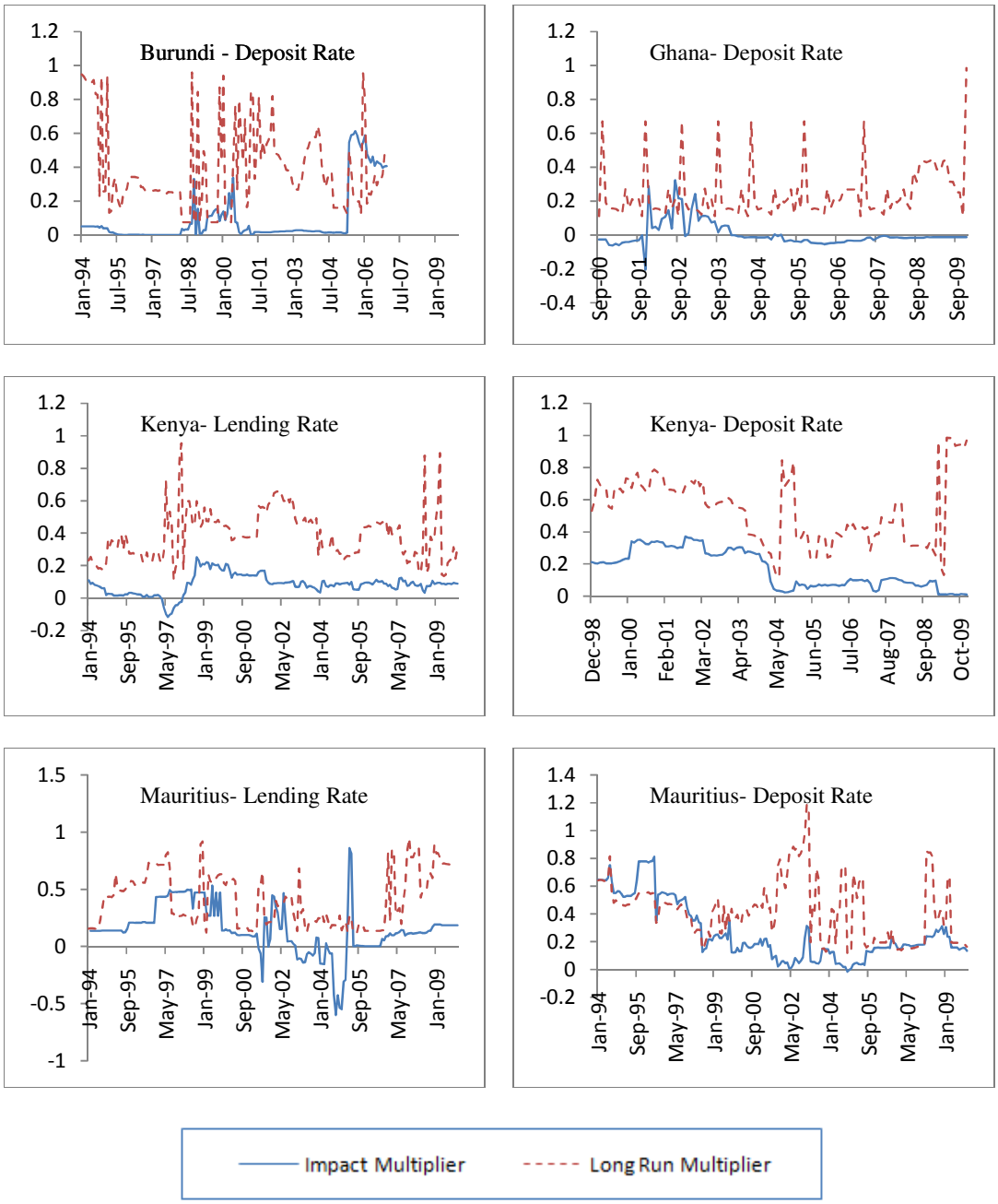
Eviews Program for Lag-Length Selection using Information Criteria (AIC)

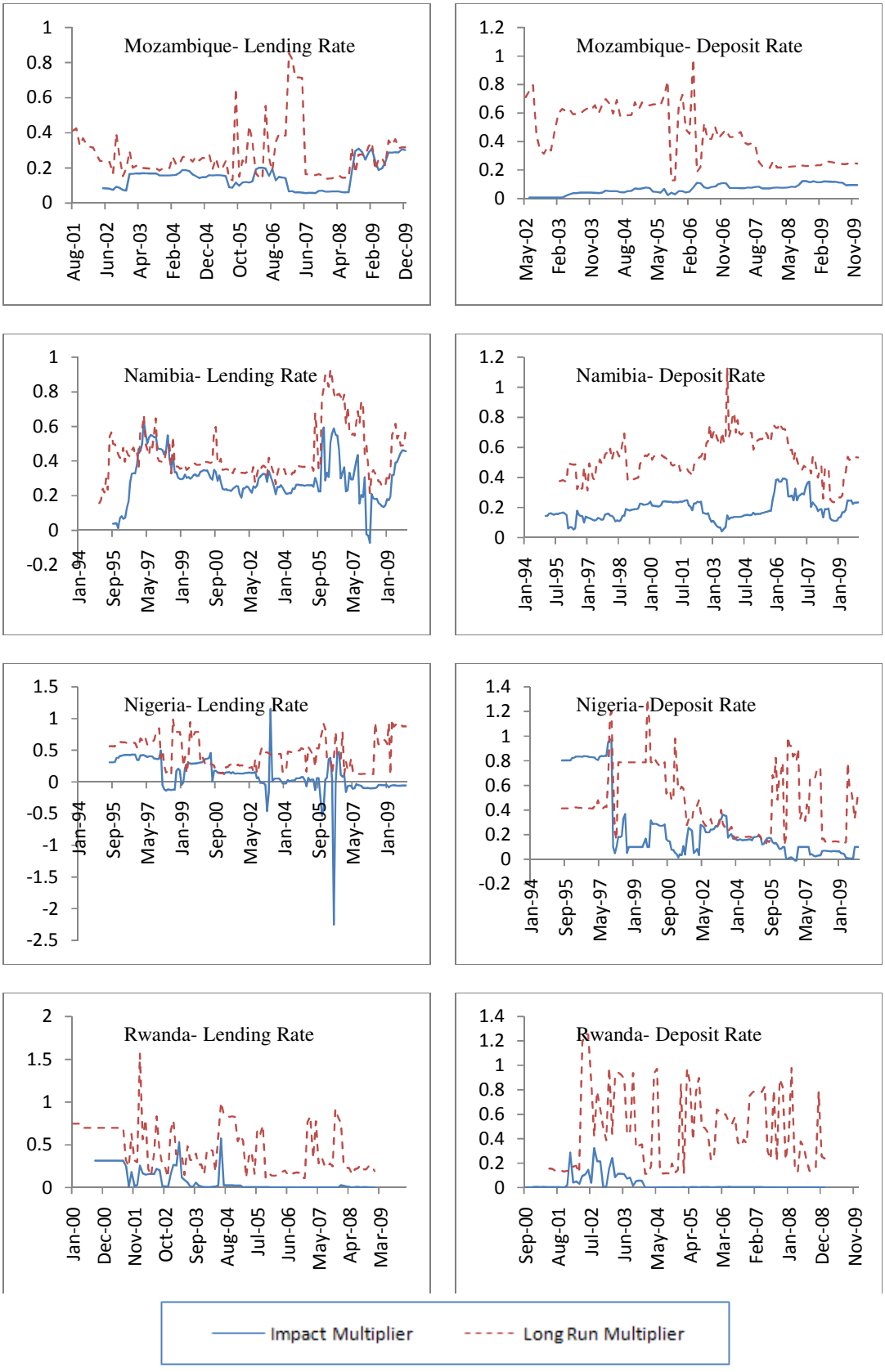
This program automatically selects lag length based on AIC for each of the rolling windows, runs appropriate ARDL type regression, and saves the desired output.

```
'if there are many countries, define the variable names in data as follows,
'Monthly  Lending rate of Nigeria = lend_nigeria;
'Monthly  Deposit rate of Nigeria = deposit_nigeria
'Monthly Money Market Rates of Nigeria = mm_nigeria

%country = "country_name_here" 'country name
%rate= "lend" 'lend for lending rate, deposit for deposit rate


scalar nobs = 240 ' total number of observations
scalar nw = 48 'estimation window size

%eqname = "EQ01"   'name of equation object that will be used.
%maxDL = "12"      'maxim um number of AR terms
%dep = "D_"+%rate+"_"+%country  'dependent variable

%regs = "C "   'independent variables
%DL =   "D_mm_"+%country   'independent variables

%criterion = "@AIC"    '"@AIC" for Akaike, "@schwarz" for Schwarz


matrix(nr,15) LT_{%country}_{%rate}   'save the results in here
!maxDL = @val(%maxDL)
close {%eqname}

genr D_{%rate}_{%country}= {%rate}_{%country} - {%rate}_{%country}(-1)

genr D_mm_{%country}= mm_{%country} -mm_{%country}(-1)


for !i = nw+1 to nobs


smpl !i-nw+1  !i  ' this leaves a sample size of nw

!mincrit = 1e12  'set the minimum to an artificially large value to begin

'estimate the models
%DLstring = ""
for !j=1 to !maxDL
  'build up string for DL terms.
  'if !j>0 then
    %DLstring = %DLstring + %DL+"("+ @str(-!j) + ")"


 'endif
    'estimate equation
    equation {%eqname}.ls(n) {%dep} c AR(1) {%DL} {%DLstring}

    'capture criterion
    if @upper(%criterion) = "@AIC" then
       !crit = {%eqname}.@aic
    endif
```

```
    if @upper(%criterion) = "@SCHWARZ" then
       !crit = {%eqname}.@schwarz
    endif
    if @upper(%criterion) = "@HQ" then
       !crit = {%eqname}.@hq
    endif
    'compare criterion
    if !crit < !mincrit then
       !mincrit = !crit
       !bestDL = !j
       '!bestMA = !j
       %bestDLstr = %DLstring   'store the best DL string



    endif

equation eq2.ls(n) {%dep} c AR(1) {%DL}  {%bestDLstr}

for !k=1 to @ncoef-1
LT_{%country}_{%rate} (!i-nw,!k+1) =  eq2.@coefs(!k) ' 2nd parameter is beta
LT_{%country}_{%rate} (!i-nw,1) =  eq2.@coefs(@ncoef) ' 2nd parameter is beta

'define other desired parameters here like above
next

next
next

'results.line
'save c:/...../ path to save/xyz.wf1
'output off

show {%eqname}
```

Appendix 4-B
Evolution of Impact and Long Run Multipliers
(using a different lag length for each rolling window regression)

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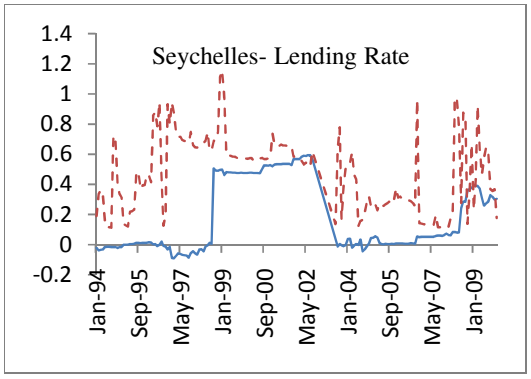
Mozambique- Deposit Rate
Namibia- Lending Rate
Namibia- Deposit Rate
Nigeria- Lending Rate
Nigeria- Deposit Rate
Rwanda- Lending Rate
Rwanda- Deposit Rate
Impact Multiplier
Long Run Multiplier


Seychelles- Lending Rate
1.4
1.2
1
0.8
0.6
0.4
0.2
0
-0.2
Jan-94
Sep-95
May-97
Jan-99
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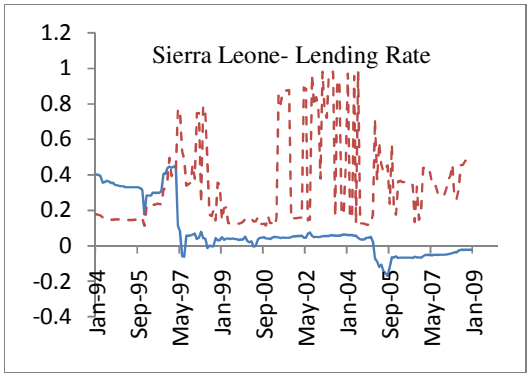
Sep-05
May-07
Jan-09


Sierra Leone- Lending Rate
1.2
1
0.8
0.6
0.4
0.2
0
-0.2
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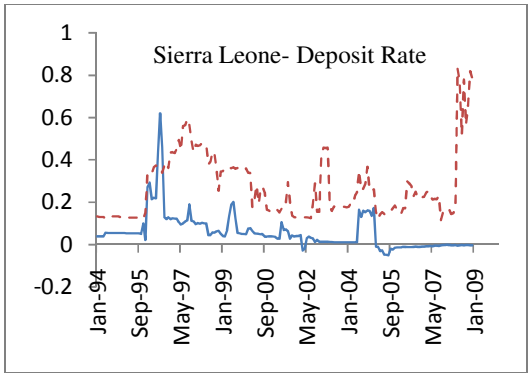
Sep-95
May-97
Jan-99
Sep-00
May-02
Jan-04
Sep-05
May-07
Jan-09


Sierra Leone- Deposit Rate
1
0.8
0.6
0.4
0.2
0
-0.2
Jan-94
Sep-95
May-97
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May-02
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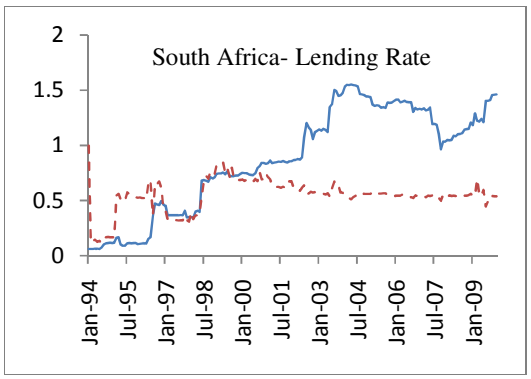
Sep-05
May-07
Jan-09


South Africa- Lending Rate
2
1.5
1
0.5
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Jul-95
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Jan-00
Jul-01
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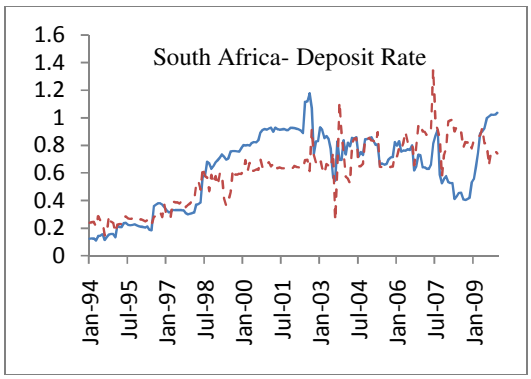
South Africa- Deposit Rate
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
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Jul-95
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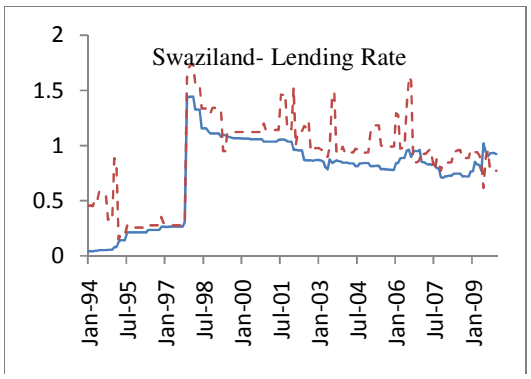
Jan-06
Jul-07
Jan-09


Swaziland- Lending Rate
2
1.5
1
0.5
0
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Jul-95
Jan-97
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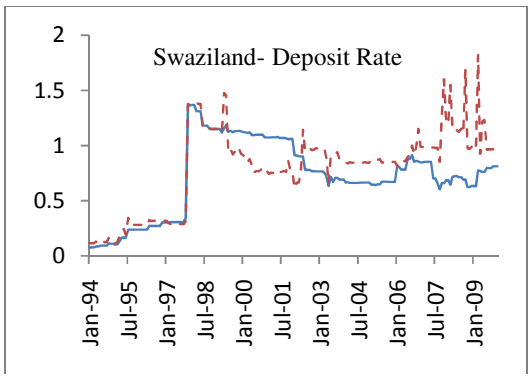
Jan-09


Swaziland- Deposit Rate
2
1.5
1
0.5
0
Jan-94
Jul-95
Jan-97
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Jan-03
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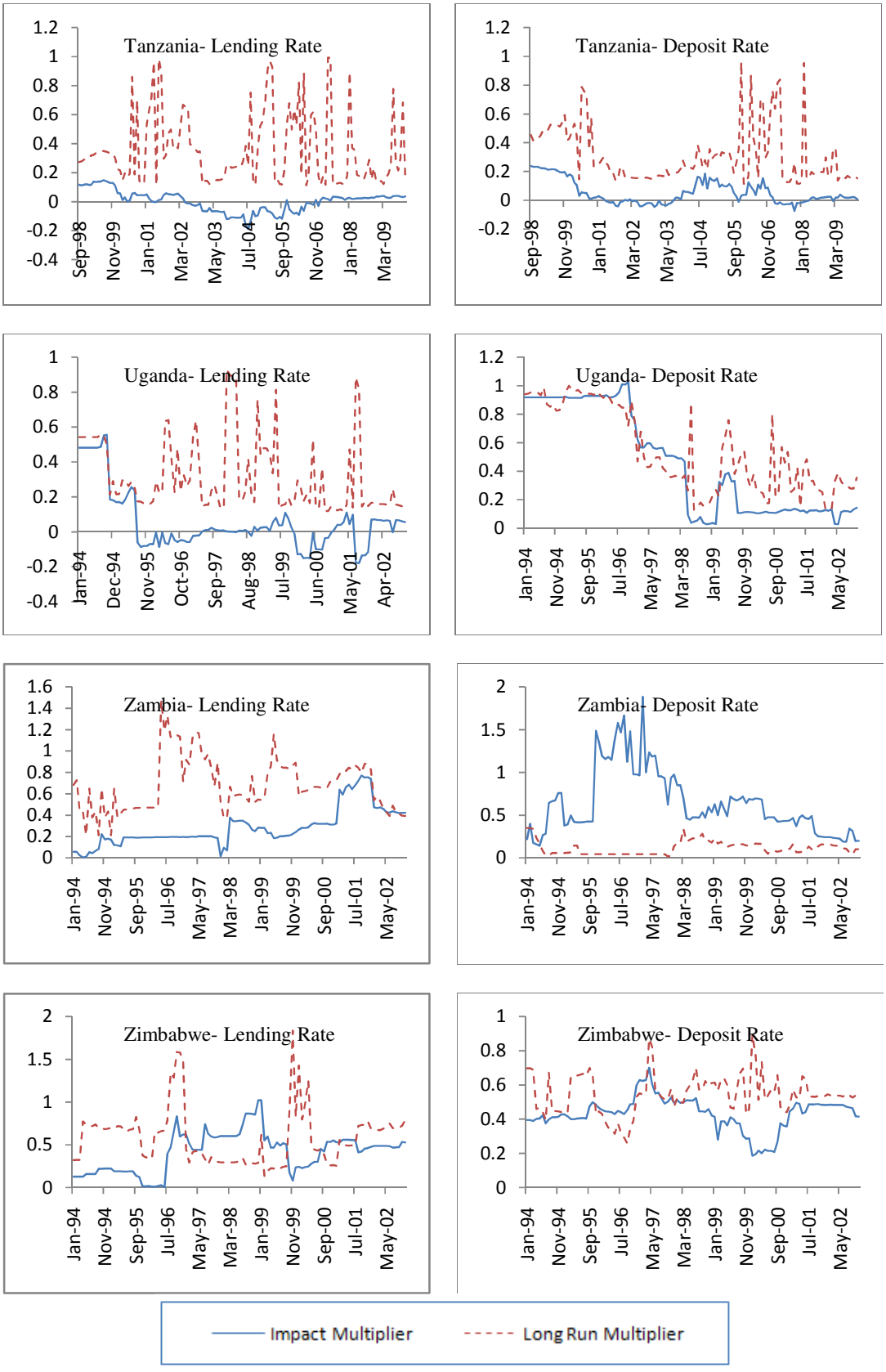
Jan-06
Jul-07
Jan-09


Impact Multiplier
Long Run Multiplier


Tanzania- Lending Rate
Tanzania- Deposit Rate
Uganda- Lending Rate
Uganda- Deposit Rate
Zambia- Lending Rate
Zambia- Deposit Rate
Zimbabwe- Lending Rate
Zimbabwe- Deposit Rate
Impact Multiplier
Long Run Multiplier

5

Financial Constraint and Stock Returns - Evidence from G-7 Countries

"Risk is return, return is risk.
That is all ye know on earth,
and all ye need to know."
(John Keats)

5.1 Introduction

The notion of the risk-return relationship is not novel and the knowledge of its existence is not restricted to the economists. As suggested by Keats, this phenomenon was appreciated by non-financial circles as well long before it was formalized and further developed by economists.

Building on the work of Markowitz (1952) and Tobin (1958); Sharpe (1964), Lintner (1965) and Mossin (1966) developed the Capital Asset Pricing Model (CAPM). This model starts with an assumption that investors form their portfolios following the Markowitz (1952) logic. It hypothesizes that the only priced risk in market is the risk

associated with market portfolio that cannot be diversified away. CAPM states that expected return on a risky asset is a linear function of its covariance with the market portfolio.

CAPM was, however, not the last word in explaining the expected returns. Fama and French (1992) observe that positive loading on excess market returns disappear during the 1963-1990 period in the US market. Moreover, they also find a negative relation between size of a firm, measured by its Market Equity (ME) and average stock returns, and a positive relationship between book to market equity ratio (BE/ME) of stock and the average stock returns.

This observation led Fama and French (1993, 1996) to propose a better three-factor model to explain variation in cross section of expected stock returns. The three factor proposed by Fama and French (1993) are excess returns on market portfolio, size factor (Small Minus Big or SMB), calculated as returns on portfolio of small stocks less the returns on portfolio of big stocks and value factor (High Minus Low or HML) calculated as returns on portfolio of stocks with high BE/ME less returns on portfolio of stocks with low BE/ME ratio. Fama-French three factor model states that expected returns on stocks are linearly related to factor loadings on the returns of three portfolios constructed to replicate underlying market, size and value (BE/ME) risk factors. Formally, their three factor model can be written as:

$$E(R_i) - R_{rf} = \beta_i (E(R_m) - R_{rf}) + \beta_{is} E(SMB) + \beta_{ih} E(HML)$$

Where, $E(R_i)$ and $E(R_m)$ are expected returns on an asset *i* and the market portfolio, respectively, R_{rf} is the risk free rate, and E(SMB) and E(HML) are expected returns of

SMB and HML portfolios as defined above. β_i , $\beta_{is,}$ and β_{ih} are the slopes of regression of a stock's excess return on the market portfolio's excess return and SMB and HML factors. The three slope coefficients represent the risk that is compensated by the market.

Later on several other factors were identified that may explain cross-sectional variation in expected stock returns. Notable amongst them are Momentum, TERM (Return on Long-term Government Bonds – T-bill rate), Leverage and Liquidity factors. However, the three factors introduced by Fama and French (1993) dominate the literature on factor pricing.

In the literature on financial development and economic growth, it is a long held observation that the firms differ in their ability to generate adequate external or internal financial resources to finance their projects. The sensitivity of corporate investment to financial constraints is also a well known fact. It is also established that this sensitivity varies amongst different firms as documented by, for example, Fazzari, Hubbard et al. (1988) and Whited (1992). This phenomenon is exploited by Lamont, Polk et al. (2001), Campello and Chen (2005) and Whited and Wu (2006) to analyze the impact of financial constraint on stock returns.

Lamont, Polk et al. (2001) find negative returns associated with financially constrained firms. In contrast, Li (2011) reports positive returns for the financially constrained firms especially in high R&D industries. Whited and Wu (2006) document that the financial constraint factor explains the returns in small firms. Campello and Chen (2005) also note that financial constraint is a priced risk.

My work in this chapter resembles mostly to Lamont, Polk et al. (2001), and Whited and Wu (2006) although its scope is broader as I study the impact of financial constraint factor in explaining cross-sectional variation of returns in G-7 countries. To analyze this, I use an augmented model by including a Financial Constraint factor in the existing Fama-French three-factor model. I choose to study all G-7 markets because these countries represent important industrialized economies and it is crucial to understand if Financial Constraint factor is significant across all markets or if there are important cross-country differences.

The results show that Financial Constraint factor is significantly positive for portfolios with smaller firms or value firms, which means that for these categories of stocks, financial constraint is a priced risk. The Financial Constraint factor is especially significant for the portfolios at the intersection of Small-Value firms. This factor does not replace any of the three standard Fama-French Factors as they remain significant when the Financial Constraint Factor is introduced. The results also confirm the presence of a size and value factor in G-7 markets.

Cross-country differences in GDP growth rates, banking sector development and equity market development do not appear to have any noticeable effect on the size or significance of the coefficient of FC factor. However, in sub-periods within a country, there is some evidence of a relationship between GDP growth rate and coefficient of FC factor as generally a higher average GDP growth rate coincides with a bigger and more significant coefficient of FC factor.

Rest of the chapter is structured as follows: Section I presents an overview of the relevant literature, Section II describes the data and presents summary statistics, Section III gives an overview of empirical model and methodology employed in the

chapter, Section IV documents and discusses the empirical findings and section V concludes.

5.2 Literature Review

5.2.1 The Factor Model

The most well-known model in the capital market theory is Capital Asset Pricing Model that attempts to determine a theoretically appropriate required rate of return on an asset. Empirical research, however, shows that average returns on stocks have little relation to the market betas of Sharpe (1964) and Lintner (1965).

In a seminal paper, Fama and French (1992) document that the market beta alone has little power in explaining the variation in stock returns. They report that firm size and book-to-market equity ratio can explain cross-sectional variation in stock returns. Fama and French (1993, 1996) posit that a three-factor model largely captures the average returns in the US stock portfolios constructed on firm size and book-to-market equity. Fama and French (1998) provide international evidence on the value premium by observing that the value stocks (high book-to-market equity) outperform growth stocks (low book-to-market equity) in most of the major international markets. Moreover, the Fama-French three-factor model appears robust in other markets as well[42].

Daniel and Titman (1997), however, argue that the characteristics of firms rather than their covariance structure better explains the variation in the cross section of the average stock returns. Davis, Fama et al. (2000) refute this claim and demonstrate that the three-factor model is robust in the US.

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[1] For example, Chui and Wei (1998) test the Fama-French model for pacific basin emerging markets, Drew and Veeraraghavan (2001; Drew and Veeraraghavan (2002)test the model for several Asian markets, Drew, Naughton et al. (2003) test the model on Chinese Market, and Malin and Veeraraghavan (2004) apply the model to French, German and the UK stock markets.

By studying the US, the UK, Japanese and Canadian markets, Griffin (2002) reports that domestic Fama-French factor models explain the variation in international returns better than a global version of the model.

5.2.2 Financial Constraint and Stock Returns:

A firm is defined as financially constrained if it cannot finance its investment activities either by internal means or external sources. There are several criteria that are used in the literature to classify firms as financially constrained or unconstrained. Most commonly used criteria include firm age, asset size as used by Gertler and Gilchrist (1994), dividend payout ratio introduced by Fazzari, Hubbard et al. (1988), Bond Rating first used by Whited and Wu (2006), Commercial Paper Rating as used by Calomiris, Himmelberg et al. (1995), and the Kaplan and Zingales (1997) Index.

Earlier literature on financial constraint attempts to establish a relationship between financial constraint and investment of firms. In a seminal paper, Fazzari, Hubbard et al. (1988) observe that more financially constrained firms have higher investment-cash flow sensitivities. Contrary to this, the Kaplan and Zingales (1997) report the least investment cash flow sensitivity in the most financially constrained firms.

Later on, the focus shifted to the impact of financial constraint on asset prices. Lamont, Polk et al. (2001) report that the stock returns of financially constrained firms move together over time. In their sample period of 1968-1997, they also find that constrained firms have lower average returns than relatively unconstrained firms. Contrary to this Jaehoon and Hangyong (2009) report a positive return for the financial constraint factor and posit that this factor is priced. Li (2011) supports this view and reports positive returns to the financially constraint firms especially in high R&D industries.

Gomes, Yaron et al. (2003) report that financing frictions provide an important common factor for the cross section of stock returns. Using the data on stock fundamentals, bonds and stock prices, Campello and Chen (2005) also report that financial constraint factor has significant explanatory power over equity returns and that the financial constraint risk is priced. Similarly, Whited and Wu (2006) document that financial constraint factor explains returns in small firms.

5.3 Data

5.3.1 Data Description:

Following Fama and French (1993), I use data of non-financial firms in the analysis. Furthermore, I also exclude all firms with negative book equity. The data collection and screening procedure is similar to the one used by Fama and French (1993) and is explained below.

Monthly price data for the US are taken from CRSP, while for other G-7 countries the price data are taken from Datastream. The corresponding accounting data for the US and Canada is supplemented from Compustat North America. For all other G-7 countries, accounting data is obtained from Compustat Global. If for any firm, the required accounting data is available but price data is missing from Datastream then for such firms, the price data are also obtained from Compustat and, whenever needed, the relevant bilateral exchange rates are applied to convert it into the currency of the other price data for that country.

Portfolios are redefined once a year at the end of every June. A stock must meet the following criteria for inclusion in the analysis for July of year t. Firstly, its stock price and book equity must be available for December of year t-1 and the stock price should

be available for June of year t. This is required because, market equity at the end of December of year t-1 will be used to compute book-to-market (BE/ME) value, and market equity for June of year t to measure firm size. Secondly, to calculate the Kaplan and Zingales (1997) Index (KZ Index) as a measure of financial constraint of firms; some additional accounting data must be available for the year t-1.

The accounting data needed to calculate the KZ Index (described later) include cash and short-term investments, liabilities and stockholder's equity-total, long term debt, depreciation and amortization, income before extraordinary items, preferred dividends, common dividends, debt in current liabilities, net income and property, plant, and equipment. To calculate KZ-Index, an additional condition is that, the sum of liabilities and stockholder's equity; and the sum of long term debt, debt in current liabilities, and stockholders' equity must be non-zero.

To proxy for the risk-free rates, I use the following interest rates. One-month t-bill rates for the US, France, and Canada, one-month FT mid rate for Germany and Italy, 3-month t-bill mid rate for the UK, and one-month Libor for Japan. All interest rate data are taken from Datastream.

To ensure a reasonable number of stocks in the portfolios, I analyze only those years where at the least 100 eligible stocks are available. Consequently, the period covered in this study runs from Jul-82 to Dec-06 for the US, Jul-90 to Dec-06 for the UK, France, Germany and Canada; Jul-97 to Dec-06 for Italy; and Jul-96 to Dec-06 for Japan.

5.3.2 Descriptive Statistics:

Summary statistics for the full and two equally sized sub-samples are reported in Table 5.1. The table shows that in the sample period the average interest rates are in the range

of 0.29% to 0.51% per month for all countries except Japan. In Japan the average interest rates are 0.019% per month.

In all markets, with the exception of Japan, the mean monthly excess market returns are positive in full sample as well as in sub-samples. In Japan, the mean excess market returns are negative during Jul-97 to Sep-01 period. The figures 5-A.1 to 5-A.7 (see Appendix 5-A) show the graphs of monthly excess market returns for the full sample for all seven countries. These graphs and the corresponding statistics show that the excess market returns display the typical features of financial time series characterized with erratic returns, frequent large outlying observations, more large negative returns than large positive ones and volatility clustering.

The mimicking portfolios for size (Small market capitalization Minus Big market capitalization or SMB), for value or book-to-market effect (High BE/ME Minus Low BE/ME or HML) and for financial constraint (more constrained minus less constrained or FC) all generate positive average returns over the sample period with only one exception. In the US, the average monthly returns on SMB portfolio are negative during Jul-1982 to Sep-1994 period

These descriptive statistics on excess market return, SMB and HML are comparable to those reported by Fama and French (1996), and Davis, Fama and French (2000) for the US market; and Griffin (2002) for the UK, Japan and Canada.

The statistics on FC factor are similar to those reported by Li (2011) for the US but are different from Lamont, Polk et al. (2001) who report negative returns to the FC factor. As financial constraint poses an additional risk, therefore, one would expect a portfolio of more constraint firms to earn higher returns than a portfolio of less constraint firms. Therefore, positive returns on the FC portfolio are more in line with theoretical .

Table 5.1
Summary Statistics

This table reports the summary statistics of the explanatory variables used in regression. The columns 1 through 5 present the statistics for the full sample period. Columns 6 through 15 report the summary statistics for the two equal-sized sub-samples.

(% per month)

	A : USA														
	Full Sample					Sub-sample 1					Sub-sample 2				
	Rf	Rm-Rf	SMB	HML	FC	Rf	Rm-Rf	SMB	HML	FC	Rf	Rm-Rf	SMB	HML	FC
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Mean	0.423	0.744	0.091	0.425	0.383	0.525	0.802	-0.012	0.399	0.400	0.321	0.667	0.210	0.436	0.366
Median	0.420	1.080	-0.170	0.375	0.445	0.530	0.980	-0.040	0.290	0.464	0.390	1.420	-0.175	0.440	0.425
Maximum	1.050	12.430	22.180	13.800	5.322	1.050	12.430	8.430	8.325	5.322	0.560	8.180	22.180	13.800	5.322
Minimum	0.060	-23.130	-16.700	-12.800	-3.126	0.210	-23.130	-8.420	-6.532	-3.126	0.060	-16.200	-16.700	-12.800	-3.126
Std Dev	0.193	4.343	3.338	3.122	2.350	0.182	4.390	2.378	2.475	2.156	0.143	4.301	4.076	3.657	2.543
No of Months	294					147					147				
Sample Period	Jul-82 - Dec-06					Jul-82 - Sep-04					Oct-04- Sec-06				

	B : UK														
	Full Sample					Sub-sample 1					Sub-sample 2				
	Rf	Rm-Rf	SMB	HML	FC	Rf	Rm-Rf	SMB	HML	FC	Rf	Rm-Rf	SMB	HML	FC
Mean	0.505	0.087	0.107	0.423	0.161	0.618	0.167	0.034	0.462	0.083	0.391	0.008	0.180	0.383	0.238
Median	0.453	0.578	0.106	1.344	1.269	0.544	0.284	0.061	1.469	0.644	0.392	0.683	0.150	1.219	1.894
Maximum	1.196	9.974	5.324	7.325	5.826	1.196	9.974	5.324	7.325	5.826	0.555	8.686	4.321	3.354	4.235
Minimum	0.277	-12.278	-6.324	-6.201	-4.717	0.397	-11.349	-6.324	-6.201	-4.717	0.277	-12.278	-3.215	-4.325	-3.257
Std Dev	0.190	3.991	3.230	2.412	2.092	0.206	4.085	3.460	2.637	1.629	0.063	3.914	3.000	2.188	2.556
No of Months	198					99					99				
Sample Period	Jul-90 - Dec-06					Jul-90 - Sep-98					Oct-98 - Dec-06				

	C : France														
	Full Sample					Sub-sample 1					Sub-sample 2				
	Rf	Rm-Rf	SMB	HML	FC	Rf	Rm-Rf	SMB	HML	FC	Rf	Rm-Rf	SMB	HML	FC
Mean	0.407	0.260	0.094	0.560	0.439	0.570	0.064	0.017	0.521	0.323	0.249	0.456	0.171	0.599	0.556
Median	0.290	0.883	0.031	0.807	0.895	0.532	0.330	0.025	0.751	0.525	0.236	1.126	0.038	0.864	1.264
Maximum	1.031	13.146	9.247	6.152	5.092	1.031	12.958	5.723	5.353	5.092	0.411	13.146	9.247	6.152	4.138
Minimum	0.167	-17.767	-6.939	-6.435	-3.768	0.268	-15.355	-6.320	-5.598	-3.768	0.167	-17.767	-6.939	-6.435	-2.892
Std Dev	0.238	5.655	2.906	2.254	1.960	0.240	5.889	2.789	2.097	1.624	0.076	5.433	3.023	2.410	2.296
No of Months	198					99					99				
Sample Period	Jul-90 - Dec-06					Jul-90 - Sep-98					Oct-98 - Dec-06				

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Table 5.1.: Summary Statistics (continued from previous page)

D : Italy

	Full Sample					Sub-sample 1					Sub-sample 2				
	Rf	Rm-Rf	SMB	HML	FC	Rf	Rm-Rf	SMB	HML	FC	Rf	Rm-Rf	SMB	HML	FC
Mean	0.285	0.679	0.189	0.374	0.317	0.360	0.972	0.195	0.473	0.242	0.209	0.387	0.182	0.274	0.391
Median	0.267	0.998	0.041	0.747	0.954	0.368	0.006	0.043	0.946	0.561	0.180	1.590	0.040	0.549	1.348
Maximum	0.569	23.130	10.553	6.736	5.432	0.569	23.130	10.553	6.736	5.432	0.300	9.989	9.863	3.907	4.413
Minimum	0.168	-15.644	-7.920	-6.026	-4.019	0.211	-15.644	-7.920	-6.026	-4.019	0.168	-14.813	-7.402	-3.495	-3.085
Std Dev	0.108	6.172	3.337	1.887	2.091	0.100	7.493	3.450	2.388	1.733	0.043	4.548	3.224	1.385	2.450
No of Months	114					57					57				
Sample Period	Jul-97 - Dec-06					Jul-97-Mar-02					Apr-02 - Dec-06				

E : Germany

	Full Sample					Sub-sample 1					Sub-sample 2				
	Rf	Rm-Rf	SMB	HML	FC	Rf	Rm-Rf	SMB	HML	FC	Rf	Rm-Rf	SMB	HML	FC
Mean	0.374	0.619	0.175	0.358	0.209	0.494	0.870	0.168	0.294	0.234	0.253	0.381	0.181	0.421	0.183
Median	0.286	0.553	0.049	0.708	0.503	0.414	0.897	0.047	0.583	0.565	0.240	0.447	0.051	0.833	0.441
Maximum	0.818	21.164	9.247	5.404	5.437	0.818	16.695	8.600	3.783	5.437	0.413	21.164	9.247	5.404	4.241
Minimum	0.168	-25.696	-6.937	-5.557	-4.064	0.253	-17.990	-6.451	-3.890	-4.064	0.168	-25.696	-6.937	-5.557	-3.170
Std Dev	0.198	6.177	3.070	1.837	1.523	0.210	5.327	2.959	1.513	1.711	0.074	6.907	3.182	2.161	1.335
No of Months	198					99					99				
Sample Period	Jul-90 - Dec-06					Jul-90 - Sep-98					Oct-98 - Dec-06				

F : Canada

	Full Sample					Sub-sample 1					Sub-sample 2				
	Rf	Rm-Rf	SMB	HML	FC	Rf	Rm-Rf	SMB	HML	FC	Rf	Rm-Rf	SMB	HML	FC
Mean	0.389	0.355	0.626	0.440	0.221	0.489	0.060	0.681	0.349	0.368	0.289	0.651	0.571	0.531	0.073
Median	0.370	0.884	0.021	0.411	0.420	0.438	0.563	0.020	0.399	0.295	0.258	1.540	0.023	0.423	0.545
Maximum	1.108	11.451	5.067	2.918	2.853	1.108	7.236	4.188	2.774	2.853	0.458	11.451	5.067	2.918	2.286
Minimum	0.156	-20.592	-3.802	-2.964	-2.118	0.212	-20.592	-3.628	-2.767	-2.118	0.156	-13.756	-3.802	-2.964	-1.635
Std Dev	0.191	4.209	2.750	2.590	2.321	0.210	4.046	1.616	1.062	0.906	0.096	4.366	1.685	1.134	1.085
No of Months	198					99					99				
Sample Period	Jul-90 - Dec-06					Jul-90 - Sep-98					Oct-98 - Dec-06				

G : Japan

	Full Sample					Sub-sample 1					Sub-sample 2				
	Rf	Rm-Rf	SMB	HML	FC	Rf	Rm-Rf	SMB	HML	FC	Rf	Rm-Rf	SMB	HML	FC
Mean	0.019	0.159	0.282	0.396	0.259	0.031	-0.487	0.346	0.438	0.390	0.007	0.806	0.218	0.354	0.127
Median	0.007	0.084	-0.069	0.379	0.437	0.036	-0.999	-0.022	0.323	0.413	0.004	1.362	-0.116	0.435	0.461
Maximum	0.076	13.883	4.534	6.660	4.411	0.076	13.883	3.655	6.660	2.427	0.039	8.704	4.534	3.754	4.411
Minimum	0.003	-10.601	-3.877	-5.402	-2.824	0.005	-10.601	-3.877	-5.402	-2.824	0.003	-8.572	-3.654	-4.466	-2.679
Std Dev	0.019	5.412	4.320	3.040	1.978	0.020	6.066	2.149	2.051	1.781	0.009	4.626	3.359	2.900	2.106
No of Months	126					63					63				
Sample Period	Jul-96 - Dec-06					Jul-96- Sep-01					Oct-01 - Dec-06				

expectations. The difference between my results and those reported by Lamont, Polk et al. (2001) may be attributed to different sample periods, different application of the KZ Index[43], and different cut-off levels to construct FC factor.

Correlation matrices of the four factors over the full sample period are given in Tables 5-B.1 to 5-B.7 (see Appendix 5-B). These tables show that excess market returns are positively correlated with both SMB and FC in most of the markets, suggesting higher returns for smaller and financially constrained firms that are presumed to be riskier. In the UK and Japan excess market returns are negatively correlated with the SMB factor. HML is negatively correlated with both SMB and excess market returns in all markets other than two exceptions. In the UK, HML is positively correlated with both SMB and excess markets returns, and in Italy, SMB and HML have a positive correlation. The directions of the correlations are similar to those reported by Griffin (2002) for the US, Japan, Canada and, the UK. In all markets, FC factor is positively correlated with excess market returns and SMB factor, and negatively correlated with the HML factor

5.4 Methodology and Empirical Model:

5.4.1 Portfolio Construction:

Following the mimicking portfolio approach of Fama and French (1993), I form six size-BE/ME portfolios. I choose to form six portfolios instead of 25 or 100 portfolios to have a reasonable number of stocks in each portfolio even when the number of eligible stocks is low.

[43] I apply KZ Index to all firms irrespective of the direction of sales growth, whereas, Lamont et al (2001) apply only to the firms with positive sales growth

For each country, portfolios are constructed at the end of each June by the intersection of two size portfolios and three portfolios formed on the basis of book equity to market equity (BE/ME). For portfolio formation stocks are first sorted on the basis of their Market Equity. For year t, the stocks above the median at the end of June of year t are categorized as Big and the ones below median as Small. A second sort is done on the basis of Book Equity/ Market Equity ratio (BE/ME). BE/ME for June of year t is the book equity for the year ending in t-1 divided by ME for December of t-1. Stocks falling in the top 30th percentile, on the BE/ME sort, are categorized as High BE/ME, stocks falling in the bottom 30th percentile BE/ME are categorized as Low BE/ME stocks, and the stocks in between them are categorized as Medium BE/ME Stocks. The following figure illustrates the six portfolios:

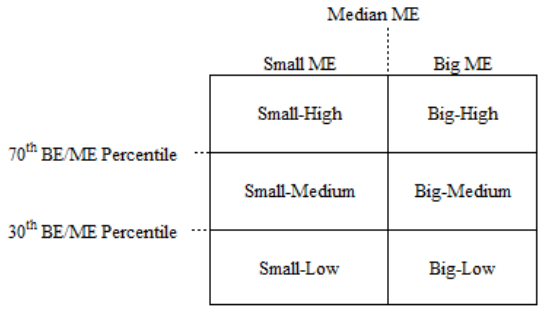

Figure 5.1: This figure depicts the formation of six portfolios formed by double sorting the stocks on the basis of their Market Value (ME) and BE/ME ratio. The figure is adapted from the website of Kenneth R. Fama; *http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/)*

The six portfolios so obtained from the intersection of the above 2x3 sort are following. The Small-Low portfolio comprises firms that are both small in terms of market capitalization and low in book-to-market equity ratio, the Small-Medium portfolio comprises firms that are small in terms of size and are medium in terms of book-to-market Equity ratio, and the Small-High portfolio comprises firms that are small in terms of market capitalization and have high book-to-market equity ratio. The

Big-Low, Big-Medium and Big-High portfolio are defined similarly on the basis of market equity (size) and BE/ME ratio.

5.4.2 Fama-French Factor Construction:

The standard Fama-French factors are constructed using six size-value portfolios defined above, verbatim as explained by Fama and French (1993). SMB (Small Minus Big) is the average return on the three small portfolios less the average return on the three big portfolios:

$$\text{SMB} = 1/3\ (\text{Small Value} + \text{Small Neutral} + \text{Small Growth}) - 1/3\ (\text{Big Value} + \text{Big Neutral} + \text{Big Growth})$$

HML (High Minus Low) is the average return on the two value portfolios (high B/E ratio) minus the average return on the two growth portfolios (low B/E ratio):

$$\text{HML} = 1/2\ (\text{Small Value} + \text{Big Value}) - 1/2\ (\text{Small Growth} + \text{Big Growth})$$

Rm-Rf, is the excess return on market and is constructed by subtracting respective risk-free rates from market returns.

5.4.3 Financial Constraint (FC) Factor Construction:

To construct FC factor, I sort the stocks on the basis of Kaplan and Zingales (1997) Index (KZ Index). I use KZ Index as an indicator of financial constraint because it is widely used in the literature and it is also relatively more sophisticated than age, firm size or dividend payout.

The sorted stocks are then divided at median into two portfolios of high and low KZ scores. The FC factor is then calculated as the average return on the portfolio of firms

with high KZ score (more constrained firms) minus average returns on the portfolio of firms with low KZ score (less constrained).

5.4.3.1 KZ- Index Construction:

The KZ Index is constructed based on the results of Kaplan and Zingales (1997), by using following linearization as proposed by Lamont et al. (2001):

$$\text{KZ Index} = -1.002\times\text{Cashflows/K} + 0.283\times\text{Q} + 3.139\times\text{Leverage} - 39.368\times\text{Dividends/K} - 1.315\times\text{Cash/K}$$

Where;[44]

Cashflows = item 18, income before extraordinary items + item 14, depreciation and amortization

Q = (item 6, total liabilities and stockholders' equity + December market equity – item 60, total common equity – item 74, deferred taxes)/(item 6, total liabilities and stockholders' equity)

Leverage = (item 9, long-term debt + item 34, debt in current liabilities)/(item 9, long-term debt + item 34, debt in current liabilities + item 216, stockholders' equity)

Dividends = item 21, common dividends + item 19, preferred dividends

Cash = item 1, cash and short-term investments

K= item 8, net property, plant, and equipment

It may be noted that KZ-Index is based only on the US manufacturing firms from 1970 to 1984 that have a positive sales growth. However, I apply the same index to other countries and other periods for all firms irrespective of the direction of their sales

[44] These are the data definitions for USA and Canada from Compustat North America. For the corresponding data definitions for other countries from Compustat Global please see Appendix A-3

growth. In this chapter, the financial constraint index is used only to rank firms into two broad portfolios of high or low financial constraint; therefore, it is reasonable to use this index outside the US as well. Moreover, certain other measures, for example, the Z-score developed by Altman (1968) using the US data bankruptcy from 1946 and 1965 and the O-Score developed by Ohlson (1980) using the US data from 1970-76 are widely applied to other periods and other countries outside of the US.

5.4.4 Empirical Model:

The model used in this chapter is based on the established literature on factor pricing, which begins with the work of Fama and French (1993). My empirical model adds a Financial Constraint (FC) Factor to the standard Fama-French three-factor model. The extended model is given as under:

$$R_{pt} - R_{rft} = \beta_0 + \beta_m (R_{mt} - R_{rft}) + \beta_s SMB_t + B_h HML_t + B_f FC_t + \varepsilon_t, \quad (1)$$

Where;

R_{pt} = *Return on the portfolio 'p' in month t*

R_{rft} = *Risk-free interest rate in month t*

R_{mt} = *Market Returns in month t*

SMB_t = *Small minus Big Factor in month t as explained above*

HML_t = *High minus Low Factor in month t as explained above*

FC_t = *More Constrained minus Less Constrained Factor in month t as explained above*

For every month for which the data is available, returns of each of the six portfolios, as defined previously, are regressed against the four factors to see if these factors explain

excess returns. For each country, regression (1) is applied once on the full sample, and for robustness check once on each of the two equally sized sub-samples.

5.5 Empirical Results and Discussion

Results of the regression (1) applied on full set of data and sub-samples are presented in Table 5.2 through 5.8. The first five columns of the tables report the results obtained from six separate regressions – one on each of the six size-BE/ME portfolios. The next ten columns report the regression results of the two equal-sized sub-samples.

Before analyzing the coefficient of the Financial Constraint factor which is the parameter of prime interest in this study, I would first succinctly discuss other regression coefficients.

5.5.1 Intercept and Excess Market Returns:

In these regressions, the intercept varies from negative to positive. It remains small and insignificant in almost all regressions, both in full-period and in sub-periods, in all six portfolios across the seven countries. This indicates that pricing errors are small. In only 5 out of 126 regressions, intercept is significant at 5% or 10% levels.

The coefficient of excess market returns is predominantly positive and significant in most of regressions across the six portfolios in all G-7 countries. This indicates that generally the portfolio returns are sensitive to the variation in market returns. Occasionally, this coefficient is indistinguishable from zero at 10% level in a few portfolios in sub-periods; this is observed in only 6 out of 126 regressions.

5.5.2 Size Factor:

In most of the regressions across all countries, the factor loadings on size factor are largely positive and significant in portfolios with small-sized stocks. One notable

Table 5.2

Regression Results - US

This table reports the regression results for the US data. The estimates and corresponding t-statistics are obtained from separate OLS regression of the returns of six size-value portfolio against a Constant, excess market returns, SMB factor, HML factor and KZ-Index based Financial Constraint (FC) factor. Column 1 through Column 5 presents the regression results obtained from the full sample. The regression results obtained from the two equal-sized sub-samples are reported in Column 6 through Column 15.

$$R_{pt} - R_{rft} = \beta_0 + \beta_m (R_{mt} - R_{rft}) + \beta_s SMB_t + B_h HML_t + B_f FC_t + \varepsilon_t,$$

USA

Portfolio: Small Size - Low BE/ME

	Full Sample					Sub-sample 1					Sub-sample 2				
	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(1)	(11)	(12)	(13)	(14)	(15)
Coeff	0.005	0.641	0.789	-0.216	0.185	0.008	0.728	0.798	-0.162	0.840	0.007	0.773	0.831	-0.238	0.137
T-stat	0.560	6.370***	1.884*	-2.16***	1.235	0.780	7.233***	3.157***	-1.958**	0.516	1.170	7.964***	1.130	-2.281**	1.396
Adj-R-sqr	0.609					0.634					0.659				

Portfolio: Small Size - Medium BE/ME

	Full Sample					Sub-sample 1					Sub-sample 2				
	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC
Coeff	0.007	0.536	0.973	0.053	0.174	0.001	0.628	0.868	0.033	0.249	0.000	0.750	1.220	0.092	0.145
T-stat	0.629	5.846***	2.319**	1.020	1.130	0.930	8.540***	2.212**	0.536	1.864*	-0.510	7.173***	3.110***	1.709*	1.483
Adj-R-sqr	0.511					0.677					0.532				

Portfolio: Small Size - High BE/ME

	Full Sample					Sub-sample 1					Sub-sample 2				
	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC
Coeff	0.010	0.752	1.399	0.192	0.216	0.006	0.659	0.928	0.229	0.185	0.009	0.849	1.425	0.169	0.247
T-stat	0.871	7.820***	4.310***	2.019**	1.877*	0.456	7.214***	3.852***	2.187**	1.719*	0.925	9.464***	4.220***	1.870*	2.341**
Adj-R-sqr	0.560					0.583					0.788				

*** significant at 1%, ** significant at 5%, * significant at 10%

Continued to next page…

Table 5.2 : Regression Results - US (continued from previous page)

	Portfolio: Big Size - Low BE/ME														
	Full Sample					Sub-sample 1					Sub-sample 2				
	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(1)	(11)	(12)	(13)	(14)	(15)
Coeff	0.002	0.813	-0.246	-0.367	-0.110	0.001	0.692	0.139	-0.373	0.330	0.009	0.868	0.540	-0.383	-0.700
T-stat	0.424	9.490***	-0.222	-2.360**	-0.860	0.180	6.847***	0.884	-2.217**	0.179	1.670	7.960***	0.375	-2.682***	-0.550
Adj-R-sqr	0.629					0.834					0.655				
	Portfolio: Big Size - Medium BE/ME														
	Full Sample					Sub-sample 1					Sub-sample 2				
	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC
Coeff	-0.001	0.778	-0.110	0.037	0.253	0.000	0.719	0.465	-0.038	0.270	0.002	0.733	-0.134	0.081	0.235
T-stat	-0.740	7.869***	-0.800	0.490	1.020	0.240	6.689***	1.794*	-0.430	1.030	0.298	6.679***	-1.217	1.743*	0.874
Adj-R-sqr	0.307					0.320					0.799				
	Portfolio: Big Size - High BE/ME														
	Full Sample					Sub-sample 1					Sub-sample 2				
	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC
Coeff	-0.001	0.611	0.410	0.160	0.221	0.002	0.643	0.275	0.320	0.160	0.009	0.757	0.536	0.183	0.301
T-stat	-0.169	5.440***	1.131	3.846***	1.783*	0.144	6.915***	0.640	5.960***	0.766	0.790	8.515***	1.677*	2.483**	2.160**
Adj-R-sqr	0.589					0.614					0.719				
No of Months	294					147					147				
Sample Period	Jul-82 - Dec-6					Jul-82 - Sep-94					Oct-94 - Dec-6				

*** significant at 1%, ** significant at 5%, * significant at 10%

Table 5.3

Regression Results - UK

This table reports the regression results for the UK data. The estimates and corresponding t-statistics are obtained from separate OLS regression of the returns of six size-value portfolio against a Constant, excess market returns, SMB factor, HML factor and KZ-Index based Financial Constraint (FC) factor. Column 1 through Column 5 presents the regression results obtained from the full sample. The regression results obtained from the two equal-sized sub-samples are reported in Column 6 through Column 15.

$$R_{pt} - R_{rft} = \beta_0 + \beta_m (R_{mt} - R_{rft}) + \beta_s SMB_t + B_h HML_t + B_f FC_t + \varepsilon_t,$$

UK

Portfolio: Small Size - Low BE/ME

	Full Sample					Sub-sample 1					Sub-sample 2				
	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Coeff	-0.007	0.689	0.841	-0.229	0.182	0.006	0.887	0.823	-0.262	0.082	0.003	0.709	0.756	-0.160	0.177
T-stat	-0.816	8.398***	6.252***	-3.509***	1.630	0.488	8.283***	5.664***	-3.699***	0.532	0.295	7.516***	5.793***	-2.448***	1.701*
Adj-R-sqr	0.684					0.812					0.713				

Portfolio: Small Size - Medium BE/ME

	Full Sample					Sub-sample 1					Sub-sample 2				
	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC
Coeff	-0.009	0.613	0.732	0.078	0.136	0.001	0.638	0.614	0.044	-0.194	-0.003	0.636	1.044	0.085	0.286
T-stat	-0.841	7.833***	3.470***	0.977	1.285	0.125	8.211***	2.826***	0.613	-1.708*	-0.262	6.277***	8.042***	1.776*	2.634**
Adj-R-sqr	0.629					0.655					0.712				

Portfolio: Small Size - High BE/ME

	Full Sample					Sub-sample 1					Sub-sample 2				
	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC
Coeff	0.002	0.602	0.726	0.170	0.365	0.009	0.898	0.529	0.138	0.240	-0.013	0.689	0.806	0.163	0.420
T-stat	0.187	7.475***	5.074***	2.128**	1.917*	0.872	7.671***	3.796***	3.161***	1.499	-1.322	9.373***	6.519***	4.946***	2.518**
Adj-R-sqr	0.544					0.567					0.763				

*** significant at 1%, ** significant at 5%, * significant at 10%

Continued to next page…

Table 5.3 : Regression Results - the UK (continued from previous page)

	Portfolio: Big Size - Low BE/ME														
	Full Sample					Sub-sample 1					Sub-sample 2				
	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Coeff	-0.008	0.845	-0.048	-0.368	-0.016	-0.004	0.591	-0.209	-0.232	0.034	-0.004	0.803	0.159	-0.191	-0.007
T-stat	-1.715*	10.143***	-0.342	-4.886***	-0.147	-0.503	7.601***	-1.714*	-2.953***	0.250	-0.443	8.233***	1.136	-2.287***	-0.048
Adj-R-sqr	0.552					0.668					0.575				
	Portfolio: Big Size - Medium BE/ME														
	Full Sample					Sub-sample 1					Sub-sample 2				
	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC
Coeff	0.000	0.670	-0.083	0.235	0.148	0.001	0.522	-0.071	0.108	0.231	0.001	0.653	0.185	-0.070	0.148
T-stat	-0.005	7.512***	-0.987	1.920*	1.421	0.115	6.056***	-1.091	2.110**	1.867*	0.202	6.405***	-1.732*	-1.125	0.532
Adj-R-sqr	0.661					0.787					0.689				
	Portfolio: Big Size - High BE/ME														
	Full Sample					Sub-sample 1					Sub-sample 2				
	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC
Coeff	0.002	0.541	0.056	0.154	0.015	0.010	0.565	0.140	0.118	0.074	0.004	0.673	-0.063	0.125	0.208
T-stat	0.542	4.224***	0.311	1.941**	0.120	1.139	6.268***	0.833	1.797*	0.458	0.397	7.731***	-0.614	1.886*	1.722*
Adj-R-sqr	0.420					0.653					0.438				
No of Months	198					99					99				
Sample Period	Jul-90 - Dec-06					Jul-90 - Sep-98					Oct-98 - Dec-06				

*** significant at 1%, ** significant at 5%, * significant at 10%

Table 5.4

Regression Results - France

This table reports the regression results for France data. The estimates and corresponding t-statistics are obtained from separate OLS regression of the returns of six size-value portfolio against a Constant, excess market returns, SMB factor, HML factor and KZ-Index based Financial Constraint (FC) factor. Column 1 through Column 5 presents the regression results obtained from the full sample. The regression results obtained from the two equal-sized sub-samples are reported in Column 6 through Column 15.

$$R_{pt} - R_{rft} = \beta_0 + \beta_m (R_{mt} - R_{rft}) + \beta_s SMB_t + B_h HML_t + B_f FC_t + \varepsilon_t,$$

	France														
	Portfolio: Small Size - Low BE/ME														
	Full Sample					Sub-sample 1					Sub-sample 2				
	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Coeff	0.008	0.718	0.841	-0.207	0.179	-0.007	0.749	0.572	-0.334	0.134	-0.003	0.726	0.766	-0.145	0.078
T-stat	0.858	4.423***	3.901***	-3.284***	1.021	-0.444	3.533***	3.547***	-5.481***	0.957	-0.421	4.038***	7.209***	-1.777*	0.458
Adj-R-sqr	0.513					0.534					0.717				
	Portfolio: Small Size - Medium BE/ME														
	Full Sample					Sub-sample 1					Sub-sample 2				
	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC
Coeff	-0.006	0.436	0.701	0.034	0.175	0.001	0.793	0.851	0.051	0.145	-0.004	0.695	0.951	0.153	0.310
T-stat	-0.627	3.892***	5.773***	0.971	1.655*	0.124	6.909***	8.325***	0.679	1.573	-0.485	3.894***	7.437***	1.681*	1.741*
Adj-R-sqr	0.677					0.705					0.841				
	Portfolio: Small Size - High BE/ME														
	Full Sample					Sub-sample 1					Sub-sample 2				
	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC
Coeff	-0.002	0.705	0.687	0.206	0.346	-0.007	0.695	0.669	0.098	0.408	0.019	0.680	0.627	0.159	0.436
T-stat	-0.241	3.456***	4.589***	2.931***	2.376**	-0.488	3.723***	3.326***	1.994*	2.525**	2.079**	2.613***	2.274**	3.621***	3.138***
Adj-R-sqr	0.612					0.638					0.723				

*** significant at 1%, ** significant at 5%, * significant at 10%

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Table 5.4 : Regression Results - France (continued from previous page)

	Portfolio: Big Size - Low BE/ME														
	Full Sample					Sub-sample 1					Sub-sample 2				
	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC
Coeff	-0.008	0.905	-0.051	-0.303	0.014	-0.003	0.486	0.104	-0.241	0.044	-0.004	0.926	0.070	-0.152	-0.201
T-stat	-1.794*	3.523***	-0.308	-4.909***	0.132	-0.302	2.009**	0.520	-8.147***	0.577	-0.450	4.738***	0.663	-3.571***	-1.697*
Adj-R-sqr	0.502					0.630					0.523				
	Portfolio: Big Size - Medium BE/ME														
	Full Sample					Sub-sample 1					Sub-sample 2				
	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC
Coeff	0.000	0.613	-0.098	-0.235	0.069	0.002	0.854	-0.205	-0.184	0.080	0.001	0.542	0.102	-0.348	0.063
T-stat	-0.007	4.115***	-1.138	-2.218**	0.358	0.161	4.625***	-1.649*	-1.764*	0.921	0.201	5.782***	0.687	-3.942***	0.773
Adj-R-sqr	0.546					0.569					0.773				
	Portfolio: Big Size - High BE/ME														
	Full Sample					Sub-sample 1					Sub-sample 2				
	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC
Coeff	0.003	0.755	0.066	0.157	0.195	0.014	0.790	0.090	0.143	0.311	0.005	0.684	-0.127	0.166	0.224
T-stat	0.928	4.391***	0.513	2.956***	1.693*	1.131	4.799***	1.039	2.202**	2.323**	0.356	3.246***	-1.134	2.166**	1.762*
Adj-R-sqr	0.513					0.701					0.534				
No of Months	198					99					99				
Sample Period	Jul-90 - Dec-06					Jul-90 - Sep-98					Oct-98 - Dec-06				

*** significant at 1%, ** significant at 5%, * significant at 10%

Table 5.5

Regression Results - Italy

This table reports the regression results for Italian data. The estimates and corresponding t-statistics are obtained from separate OLS regression of the returns of six size-value portfolio against a Constant, excess market returns, SMB factor, HML factor and KZ-Index based Financial Constraint (FC) factor. Column 1 through Column 5 presents the regression results obtained from the full sample. The regression results obtained from the two equal-sized sub-samples are reported in Column 6 through Column 15.

$$R_{pt} - R_{rft} = \beta_0 + \beta_m (R_{mt} - R_{rft}) + \beta_s SMB_t + B_h HML_t + B_f FC_t + \varepsilon_t,$$

	Italy														
	Portfolio: Small Size - Low BE/ME														
	Full Sample					Sub-sample 1					Sub-sample 2				
	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Coeff	-0.008	0.735	0.134	-0.167	0.127	-0.006	0.855	0.178	-0.093	0.091	0.003	0.920	0.708	-0.153	0.114
T-stat	-0.643	5.490***	1.368	-1.810*	1.187	-0.307	6.844***	0.934	-0.847	0.428	0.345	7.255***	1.857*	-1.989**	0.756
Adj-R-sqr	0.642					0.669					0.726				
	Portfolio: Small Size - Medium BE/ME														
	Full Sample					Sub-sample 1					Sub-sample 2				
	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC
Coeff	0.010	0.583	0.495	0.043	0.105	-0.001	0.232	0.438	0.043	0.159	-0.002	0.584	0.552	0.100	0.138
T-stat	0.659	3.253***	3.862***	1.213	1.198	-0.082	1.503	3.084***	1.038	1.811*	-0.225	3.814***	3.563***	1.342	1.694*
Adj-R-sqr	0.485					0.505					0.733				
	Portfolio: Small Size - High BE/ME														
	Full Sample					Sub-sample 1					Sub-sample 2				
	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC
Coeff	0.002	0.758	0.845	0.164	0.225	-0.005	0.480	0.481	0.219	0.314	-0.010	0.547	0.883	0.175	0.110
T-stat	0.229	6.903***	5.254***	2.241**	2.537**	-0.588	3.956***	2.426**	2.824***	3.217***	-1.208	3.914***	6.318***	2.377**	1.214
Adj-R-sqr	0.558					0.581					0.630				

*** significant at 1%, ** significant at 5%, * significant at 10%

Continued to next page…

Table 5.5 : Regression Results - Italy (continued from previous page)

	Portfolio: Big Size - Low BE/ME														
	Full Sample					Sub-sample 1					Sub-sample 2				
	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC
Coeff	-0.007	0.730	-0.047	-0.198	-0.014	0.003	0.512	0.085	-0.251	-0.030	-0.003	0.682	0.217	-0.231	-0.007
T-stat	-1.187	6.915***	-0.356	-2.936***	-0.128	0.319	7.733***	0.346	-4.197***	-0.186	-0.638	4.547***	1.902*	-3.41***	-0.036
Adj-R-sqr	0.611					0.775					0.636				
	Portfolio: Big Size - Medium BE/ME														
	Full Sample					Sub-sample 1					Sub-sample 2				
	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC
Coeff	0.000	0.958	-0.181	0.045	0.146	0.001	0.550	0.061	0.100	0.107	0.001	0.442	-0.261	-0.169	0.249
T-stat	0.005	7.371***	-1.682*	0.520	1.399	0.139	3.636***	0.854	1.296	1.131	0.123	3.997***	-2.085**	-1.789*	2.064**
Adj-R-sqr	0.502					0.523					0.539				
	Portfolio: Big Size - High BE/ME														
	Full Sample					Sub-sample 1					Sub-sample 2				
	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC
Coeff	0.003	0.701	0.143	0.245	0.135	-0.008	0.473	-0.187	0.184	0.205	0.006	0.559	0.036	0.298	0.143
T-stat	0.956	4.950***	0.957	2.527**	1.536	-1.230	2.833***	-1.933*	1.426	1.952**	0.364	3.058***	0.184	3.021***	1.114
Adj-R-sqr	0.535					0.836					0.557				
No of Months	114					57					57				
Sample Period	Jul-97 - Dec-06					Jul-97-Mar-02					Apr-02 - Dec-06				

*** significant at 1%, ** significant at 5%, * significant at 10%

Table 5.6

Regression Results - Germany

This table reports the regression results for German data. The estimates and corresponding t-statistics are obtained from separate OLS regression of the returns of six size-value portfolio against a Constant, excess market returns, SMB factor, HML factor and KZ-Index based Financial Constraint (FC) factor. Column 1 through Column 5 presents the regression results obtained from the full sample. The regression results obtained from the two equal-sized sub-samples are reported in Column 6 through Column 15.

$$R_{pt} - R_{rft} = \beta_0 + \beta_m (R_{mt} - R_{rft}) + \beta_s SMB_t + B_h HML_t + B_f FC_t + \varepsilon_t,$$

	Germany														
	Portfolio: Small Size - Low BE/ME														
	Full Sample					Sub-sample 1					Sub-sample 2				
	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Coeff	0.006	0.555	0.768	-0.147	-0.114	0.003	0.421	0.863	0.028	0.079	-0.004	0.426	0.617	-0.181	-0.173
T-stat	0.598	2.598**	3.324***	-1.737*	-0.778	0.202	2.569**	2.802***	0.684	0.505	-0.303	2.558**	2.296**	-2.907***	-1.464
Adj-R-sqr	0.533					0.555					0.685				
	Portfolio: Small Size - Medium BE/ME														
	Full Sample					Sub-sample 1					Sub-sample 2				
	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC
Coeff	-0.009	0.611	0.806	0.016	0.187	-0.002	0.763	0.722	0.038	0.122	0.001	0.348	-0.210	0.063	0.213
T-stat	-0.814	4.534***	3.077***	0.409	1.120	-0.107	4.075***	3.568***	0.720	1.106	0.221	2.015**	-1.421	1.552	1.876*
Adj-R-sqr	0.542					0.565					0.772				
	Portfolio: Small Size - High BE/ME														
	Full Sample					Sub-sample 1					Sub-sample 2				
	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC
Coeff	0.002	0.327	1.011	0.143	0.196	-0.005	0.525	-0.337	0.219	0.267	0.009	-0.184	0.791	0.258	0.214
T-stat	0.169	1.805*	1.633	1.788**	1.671*	-0.530	2.114**	-1.896*	2.053**	1.911	1.263	-1.309	3.304***	2.188**	1.746*
Adj-R-sqr	0.605					0.681					0.630				

*** significant at 1%, ** significant at 5%, * significant at 10%

Continued to next page…

Table 5.6 : Regression Results - Germany (continued from previous page)

	Portfolio: Big Size - Low BE/ME														
	Full Sample					Sub-sample 1					Sub-sample 2				
	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC
Coeff	0.007	0.775	-0.069	-0.186	-0.113	0.006	0.147	0.162	-0.264	0.006	-0.002	0.436	0.069	-0.131	-0.161
T-stat	1.438	4.323***	-0.282	-3.862***	-1.102	0.629	1.618	0.664	-4.367	0.027	-0.171	2.239**	0.913	-2.751***	-1.668*
Adj-R-sqr	0.409					0.609					0.426				
	Portfolio: Big Size - Medium BE/ME														
	Full Sample					Sub-sample 1					Sub-sample 2				
	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC
Coeff	0.000	0.502	-0.314	0.054	0.081	0.001	0.289	0.605	0.089	-0.071	-0.002	0.520	0.061	0.161	0.148
T-stat	-0.008	2.441**	-1.803*	0.721	0.634	0.112	1.602	-2.434**	1.220	-0.923	-0.577	5.948***	0.741	1.453	1.312
Adj-R-sqr	0.637					0.871					0.664				
	Portfolio: Big Size - High BE/ME														
	Full Sample					Sub-sample 1					Sub-sample 2				
	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC
Coeff	-0.004	0.831	0.066	0.099	0.167	0.016	0.894	0.110	0.152	0.210	0.007	0.998	0.112	0.147	0.018
T-stat	-1.075	2.969***	0.822	1.718*	1.991**	1.756*	3.918***	0.740	1.827	2.633**	0.549	4.474***	0.536	2.216**	0.120
Adj-R-sqr	0.514					0.598					0.535				
No of Months	198					99					99				
Sample Period	Jul-90 - Dec-06					Jul-90 - Sep-98					Oct-98 - Dec-06				

*** significant at 1%, ** significant at 5%, * significant at 10%

Table 5.7

Regression Results - Canada

This table reports the regression results for Canadian data. The estimates and corresponding t-statistics are obtained from separate OLS regression of the returns of six size-value portfolio against a Constant, excess market returns, SMB factor, HML factor and KZ-Index based Financial Constraint (FC) factor. Column 1 through Column 5 presents the regression results obtained from the full sample. The regression results obtained from the two equal-sized sub-samples are reported in Column 6 through Column 15.

$$R_{pt} - R_{rft} = \beta_0 + \beta_m (R_{mt} - R_{rft}) + \beta_s SMB_t + B_h HML_t + B_f FC_t + \varepsilon_t,$$

Canada

Portfolio: Small Size - Low BE/ME

	Full Sample					Sub-sample 1					Sub-sample 2				
	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Coeff	0.007	0.641	0.657	-0.269	0.073	-0.007	0.681	0.771	-0.378	-0.058	0.004	0.595	0.516	-0.304	0.067
T-stat	0.412	3.594***	2.423**	-1.832*	0.434	-0.934	3.542***	6.620***	-2.278**	-0.300	0.612	2.597**	5.727***	-2.031**	0.784
Adj-R-sqr	0.660					0.688					0.771				

Portfolio: Small Size - Medium BE/ME

	Full Sample					Sub-sample 1					Sub-sample 2				
	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC
Coeff	0.006	0.421	0.906	0.043	0.287	0.001	0.689	0.764	0.109	0.207	0.004	0.779	0.997	-0.080	0.178
T-stat	0.509	3.313***	6.225***	1.002	1.900*	0.085	4.787***	5.884***	1.447	1.871*	0.377	4.629***	6.768***	-0.920	1.795*
Adj-R-sqr	0.561					0.584					0.732				

Portfolio: Small Size - High BE/ME

	Full Sample					Sub-sample 1					Sub-sample 2				
	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC
Coeff	0.002	0.433	0.577	0.299	0.173	0.004	0.377	0.770	0.301	0.294	-0.040	-0.230	0.329	0.266	0.124
T-stat	0.141	3.002***	2.779***	2.064**	1.577	0.244	4.064***	2.627***	1.901*	2.224**	-1.716*	1.811*	2.092**	1.772*	1.325
Adj-R-sqr	0.605					0.717					0.630				

*** significant at 1%, ** significant at 5%, * significant at 10%

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Table 5.7 : Regression Results - Canada (continued from previous page)

	Portfolio: Big Size - Low BE/ME														
	Full Sample					Sub-sample 1					Sub-sample 2				
	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC
Coeff	-0.009	0.634	-0.682	-0.209	0.017	0.002	-0.155	-0.305	0.237	-0.005	0.003	0.640	-0.610	-0.381	-0.239
T-stat	-1.488	3.935***	-2.553**	-2.349**	0.156	0.345	-1.201	-1.730*	2.675***	-0.044	0.761	4.232***	-3.108***	-3.274***	1.886*
Adj-R-sqr	0.574					0.786					0.598				
	Portfolio: Big Size - Medium BE/ME														
	Full Sample					Sub-sample 1					Sub-sample 2				
	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC
Coeff	0	0.601	-0.147	0.030	0.120	0.001	0.624	0.441	0.011	0.051	0.001	0.479	0.332	-0.040	0.169
T-stat	0.007	3.873***	-0.248	0.622	1.371	-0.279	4.536***	1.828*	0.993	0.268	-1.560	3.195***	0.993	-0.588	1.771*
Adj-R-sqr	0.756					0.787					0.797				
	Portfolio: Big Size - High BE/ME														
	Full Sample					Sub-sample 1					Sub-sample 2				
	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC
Coeff	0.004	0.941	-0.039	0.217	0.173	0.007	0.406	-0.093	0.314	0.262	-0.008	0.218	0.139	0.185	0.188
T-stat	0.748	5.093***	-0.246	2.823***	1.698*	0.625	3.285***	-1.232	3.254***	2.114**	-0.507	2.012**	0.996	2.127**	1.747*
Adj-R-sqr	0.532					0.554					0.648				
No of Months	198					99					99				
Sample Period	Jul-90 - Dec-06					Jul-90 - Sep-98					Oct-98 - Dec-06				

*** significant at 1%, ** significant at 5%, * significant at 10%

Table 5.8

Regression Results - Japan

This table reports the regression results for Japanese data. The estimates and corresponding t-statistics are obtained from separate OLS regression of the returns of six size-value portfolio against a Constant, excess market returns, SMB factor, HML factor and KZ-Index based Financial Constraint (FC) factor. Column 1 through Column 5 presents the regression results obtained from the full sample. The regression results obtained from the two equal-sized sub-samples are reported in Column 6 through Column 15.

$$R_{pt} - R_{rft} = \beta_0 + \beta_m (R_{mt} - R_{rft}) + \beta_s SMB_t + B_h HML_t + B_f FC_t + \varepsilon_t,$$

	Japan														
	Portfolio: Small Size - Low BE/ME														
	Full Sample					Sub-sample 1					Sub-sample 2				
	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Coeff	-0.005	0.622	0.375	-0.322	0.080	0.001	0.508	0.550	-0.211	-0.182	-0.004	0.546	0.421	-0.099	0.105
T-stat	-0.392	3.072***	2.836***	-2.258***	0.686	0.057	3.240***	3.331***	-1.819*	-1.922*	-0.813	2.922***	2.881***	-1.504	1.332
Adj-R-sqr	0.500					0.635					0.521				
	Portfolio: Small Size - Medium BE/ME														
	Full Sample					Sub-sample 1					Sub-sample 2				
	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC
Coeff	-0.003	0.810	0.547	0.071	0.107	-0.003	0.604	0.533	0.041	0.131	0.003	0.430	0.412	0.066	0.167
T-stat	-0.249	4.103***	3.228***	0.963	1.104	-0.439	3.216***	2.819***	1.032	1.763*	0.376	3.768***	2.220**	1.370	1.901*
Adj-R-sqr	0.603					0.628					0.763				
	Portfolio: Small Size - High BE/ME														
	Full Sample					Sub-sample 1					Sub-sample 2				
	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC
Coeff	-0.006	0.758	0.426	0.319	0.192	-0.003	0.382	0.362	0.091	0.201	-0.003	0.584	0.275	0.103	0.138
T-stat	-0.824	3.398***	3.903***	2.837***	1.761*	-0.412	2.910***	4.398***	1.189	2.483**	-0.461	3.307***	2.367**	2.243**	1.412
Adj-R-sqr	0.516					0.754					0.537				

*** significant at 1%, ** significant at 5%, * significant at 10%

Continued to next page…

Table 5.8 : Regression Results - Japan (continued from previous page)

	Portfolio: Big Size - Low BE/ME														
	Full Sample					Sub-sample 1					Sub-sample 2				
	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC
Coeff	-0.002	0.445	0.040	-0.166	-0.090	-0.003	0.416	0.154	-0.214	-0.131	0.000	0.446	0.120	-0.141	-0.005
T-stat	-0.386	3.557***	0.317	-2.254**	-0.972	-0.539	3.007***	1.488	-2.843**	-1.161	-0.074	3.628***	1.083	-2.124**	-0.039
Adj-R-sqr	0.780					..637					0.812				
	Portfolio: Big Size - Medium BE/ME														
	Full Sample					Sub-sample 1					Sub-sample 2				
	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC
Coeff	-0.004	0.433	0.065	-0.153	0.169	0.004	0.560	-0.038	-0.137	0.148	-0.004	0.432	0.043	-0.128	0.115
T-stat	-0.389	2.304**	0.717	-1.834*	1.830*	0.613	2.672***	-0.485	-1.822*	1.689*	-1.072	2.449**	0.367	-1.713*	1.187
Adj-R-sqr	0.571					0.595					0.702				
	Portfolio: Big Size - High BE/ME														
	Full Sample					Sub-sample 1					Sub-sample 2				
	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC	Const	Rm-Rf	SMB	HML	FC
Coeff	-0.004	0.159	0.182	0.214	0.206	0.003	0.048	0.205	0.215	0.240	-0.003	0.523	0.164	0.098	0.165
T-stat	-0.923	1.752*	-1.711*	2.253**	1.986*	0.416	0.831	-2.194**	2.494**	2.375**	-0.388	2.282**	-1.816*	1.337	1.785*
Adj-R-sqr	0.636					0.699					0.662				
No of Months	126					63					63				
Sample Period	Jul-96 - Dec-06					Jul-96- Sep-01					Oct-01 - Dec-06				

*** significant at 1%, ** significant at 5%, * significant at 10%

exception is Germany where in Small-High portfolio the coefficient on SMB factor is negative and marginally significant at 10% in sub-sample period of Jul-90 to Sep-98. In 4 out of total 63 regressions, this coefficient is insignificant thought positive in the portfolios comprising small stocks. Therefore, I document a significant small size effect.

The coefficient on size factor in portfolios with big stocks ranges from positive to negative. Mostly, it is either insignificantly different from zero at 10% or negative and significant.

5.5.1 Book-to-Market Equity Factor:

The slopes of HML factor are mainly negative and significant in growth portfolios (Low BE/ME). This negative loading is almost universal in growth portfolios with only three exceptions in sub-samples, where the coefficients were indistinguishable from zero at 10% significance level. On the other hand, in the value firms (high BE/ME), the coefficients of HML factor are predominantly positive and significant. In three sub-s samples, the coefficients of HML are not significant at 10% level though they are still positive

The regression coefficient on HML factor for the medium BE/ME portfolios ranges from positive to negative. In most of the regressions, these coefficients are not significantly different from zero at 10% level. There are, however, some instances where these coefficients are significant. Particularly, in France, the loadings on HML factor are negative and significant in the full period and both sub-periods in Small-Medium portfolio.

Almost universally, the coefficient on HML increases monotonically from Low to High Book-to-Market equity portfolios.

5.5.2 Financial Constraint Factor:

The coefficient of prime interest, that is, the coefficient of the Financial Constraint factor shows mixed results. Generally, it is positive and significant for portfolios at the intersection of Small-High. This significance exists across all countries except Canada, where the coefficient is positive but indistinguishably different from zero in the full-period. Moreover, the positive and significant slope persists in most of the sub-periods as well.

In five countries other than the UK and Italy, the slope of FC factor is positive and significant for portfolios at the intersection of Big-High as well. However, in these portfolios, slope of FC factor is not significant at 10% in five of the seven countries in either of the two sub-periods.

Moreover, for Small-Medium portfolios the coefficient of FC factor is positive and significant in at the least one of the two sub-periods in all countries included in this study. This significance, however, is never at 1% level.

For the Big-Medium portfolios FC is positive and significant at 5 % or 10% levels in one of the two sub-periods in the UK, Italy, Canada and Japan, and indistinguishable from zero in the other countries.

In Small-Low portfolios, the coefficient of FC factor varies from positive to negative but it almost universally insignificant from zero at 10% level. In one sub-period, this slope is negative and marginally significant at 10% in Japan and positive and significant at 10% in the UK.

In Big-Low portfolios as well, the coefficient of FC factor is predominantly indistinguishable from zero at 10% level. In one sub-period, this slope is negative and

marginally significant at 10% in France and Germany, and positive and significant at 10% for Canada.

In general, the coefficient of FC factor is significant in the portfolios comprising either the Small Firms or Value firms. It is most significant in the portfolios at the intersection of Small-Value firms. A plausible reason for this could be that, generally smaller firms are considered to be riskier than bigger firms and they have more difficulty in accessing external finance; similarly on average Value firms have higher perceived risk than the Growth firms. The portfolio at the intersection of Small-Value portfolio thus, represents most risky firms. This suggests that financial constraint factor is more important among the firms that have higher perceived risks in other aspects as well.

Although the Value firms are considered to be more risky than growth firms, yet the reason for Value firms to have positive and significant loading on the financial constraint factor is not vividly clear. Apparently, Value Firms (High BE/ME) firms have more collateral to offer to the financial institutions to secure loans, therefore, a priori these firms are expected to have lower coefficients on financial constraint factor. A possible explanation could be that although, such firms may have better collateral to offer to the financial institutions but these firms have some comparative disadvantage in raising resources from the equity market, as the market is willing to pay lesser price per unit of book value. I leave this issue for further investigation and conclude that Financial Constraint factor is priced for firms or portfolios of firms with certain characteristics.

Regression results for the FC factor for the US are consistent with the findings of Li (2011), and Whited and Wu (2006) but do not conform to the findings of Lamont et al (2001) who find a negative excess returns for the financial constraint factor.

5.5.3 Financial Constraint Factor and Economic Growth:

The full-period and sub-period averages of GDP growth rates in G-7 countries for the period under review are given in Table 5-B.8. All G-7 countries are categorized as 'High Income' countries by the World Bank. However, these countries experienced different levels of GDP growth rate during the study period. The cross-country differences in the GDP growth rates do not appear to have any noticeable bearing on the coefficient of FC factor.

In sub-periods within a country, there is some evidence of a relationship between GDP growth rate and coefficient of FC factor. In most of the sub-periods a higher average GDP growth rate coincides with bigger and more significant coefficient of FC factor, and lower GDP growth rate coincides with smaller and less significant coefficient of FC factor. However, this relationship between GDP growth rate and FC factor is not universal. Notably, in Canada and Japan the direction of this relationship is reverse.

This implies that financial constraint factor or conversely access to finance is more important during periods of higher growth. This interpretation makes economic sense because, it is the expansionary phase of economic cycles when firms are more in need of resources to finance their investment plans. In such times the firms with poorer ability to get hold of internal or external financial resources are more at a comparative disadvantage than in subdued periods. Therefore, the investors require a premium to invest in such firms, during the periods of relatively higher economic growth. These findings must be interpreted with caution, because these are mostly qualitative and are based on the set of data that is very small for this nature of study.

5.5.4 Financial Constraint Factor and Banking Sector Development:

The banking sector of G-7 countries is fairly developed. In the latest composite banking sector development rankings published by the World Bank, all G-7 countries other than Italy are ranked among the top eleven. A widely used indicator of banking sector development is Banking Sector Deposits/GDP. The graph of this measure is plotted in figure 5-A.8 (Appendix 5-A). This graph shows that this ratio is the highest for Japan and the lowest for Italy. Moreover, there is a general upward trend in this indicator across all countries.

From the study of this data, I do not find any conclusive evidence of a relationship between the degree of the development of banking sector and the size or significance of FC factor.

5.5.5 Financial Constraint Factor and Equity Market Development:

Mostly, stock markets of G-7 countries are also well developed. In the latest composite equity market development rankings published by the World Bank, five of the G-7 countries, other than Italy and Germany, are among the top ten. A widely used indicator of equity market development is Stock Market Capitalization/GDP. The graph of this measure is plotted in figure 5-A.9 (Appendix 5-A). This graph shows that this ratio is the highest for the UK and the lowest for Italy. The graph also reveals a fairly high degree of co-movement in this ratio for the G-7 countries. However, I do not observe any conclusive evidence of a relationship between the degree of development of equity markets and size or significance of FC factor.

5.6 Conclusions

The main goal of this chapter is to establish if, in the stock markets of G-7 countries, Financial Constraint factor explains cross-section of expected stock returns in addition to the standard Fama-French factors. The results show that Financial Constraint factor is priced for firms with certain characteristics. This factor is significantly positive for portfolios with smaller firms or value firms. The Financial Constraint factor is especially significant for the portfolios at the intersection of Small-Value firms. The significance of Financial Constraint factor persists across all G-7 countries and in the sub-periods as well. This factor does not replace any of the three standard Fama-French factors as they remain significant when Financial Constraint factor is introduced.

Cross-country differences in GDP growth rates, banking sector development and equity market development do not appear to have any noticeable effect on the size or significance of the coefficient of FC factor. However, in sub-periods within a country, there is some evidence of a relationship between GDP growth rate and coefficient of FC factor. In most of the sub-periods higher average GDP growth rate coincides with bigger and more significant coefficient of FC factor.

The findings of this study of observing positive excess returns on Financial Constraint factor and significant coefficients in some portfolios is in line with Whited and Wu(2006) and Li (2011). These results contradict Lamont et al (2001) who observe negative returns for the FC factor. The different results may be attributed to different sample periods, application of the KZ Index or different cut-off levels to construct FC factor

Moreover, the results further confirm the presence of a size and value effect in the G-7 countries. Further, I document that in all G-7 markets (a) the intercept of regression is

not significantly different from zero in most of the regressions, (b) coefficient of excess market returns is mostly significant and positive (c) the SMB factor has a positive loading in portfolios comprising Small Firms, (d) portfolios with Big firms have generally negative or insignificant loadings on SMB factor (e) Growth firms have negative loading on HML factor and (f) Value firms have positive loading on HML factor.

In a nutshell, the results lend support to a broader asset pricing model including Financial Constraint factor along with the standard Fama-French factors. The findings of this study largely prevail in the full sample and both sub-samples. These findings have important implications for asset pricing. Those investors who are willing to take additional risks to earn higher returns may take positions in the more financially constrained firms. These findings have implications for the evaluation of the risk-adjusted performance of portfolios as well. I argue that the performance of portfolios should be evaluated using a multifactor model that includes a Financial Constraint factor along with the standard Fama-French factors.

APPENDIX 5-A

Graphs of Monthly Excess Market Returns

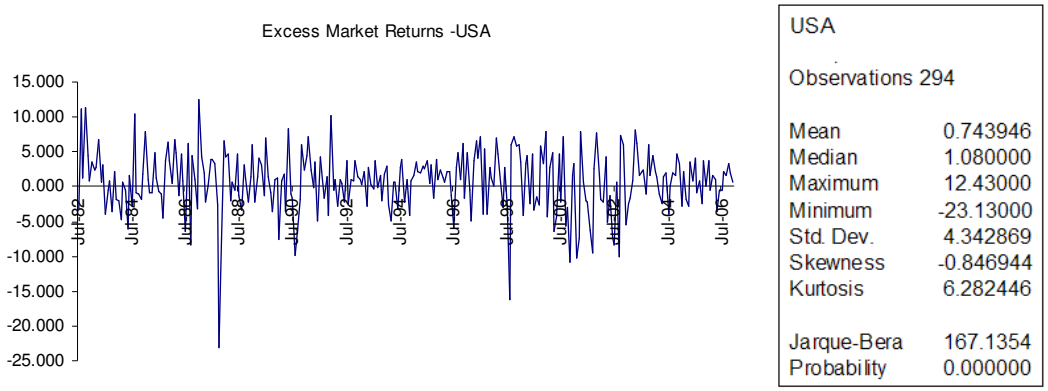


Figure 5-A.1: Graph on the left shows monthly market excess returns for the US market over the full sample period. Excess market returns were defined as market returns minus the risk-free rate. The graph shows that the market displays the characteristic features financial time series with erratic returns, frequent large outlying observations, more large negative returns than positive large positive one and volatility clustering. Table at the right presents the descriptive statistics showing that the returns are not-normally distributed and are negatively skewed.

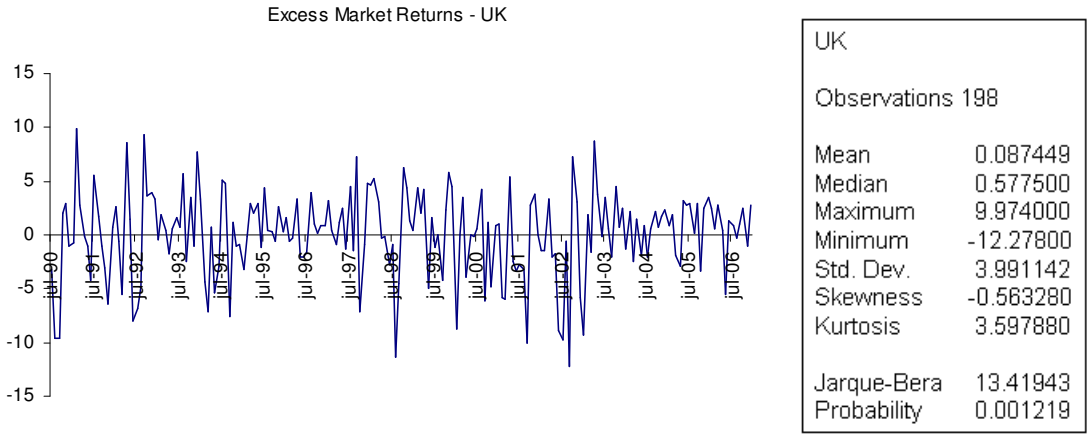
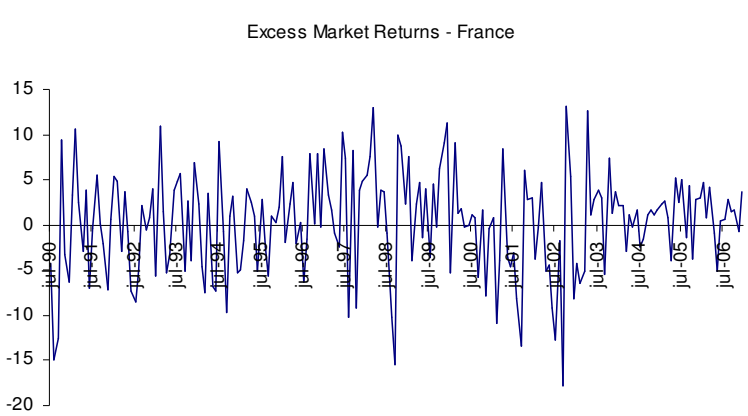
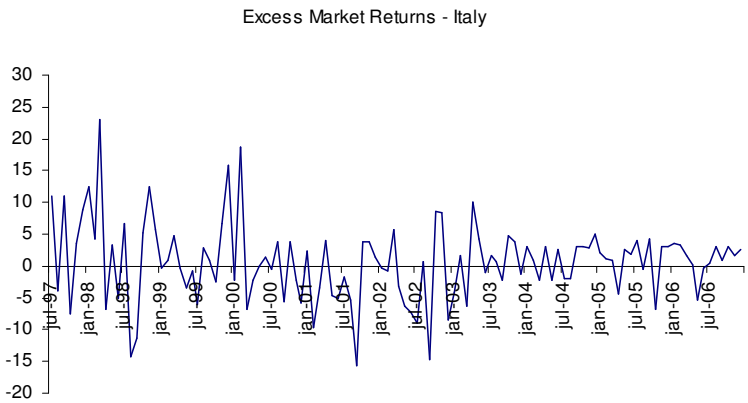


Figure 5-A.2: Graph on the left shows monthly excess market returns for UK market over the full sample period. Excess market returns were defined as market returns minus the risk-free rate. The graph shows that the market displays the characteristic features financial time series with erratic returns, frequent large outlying observations, more large negative returns than positive large positive one and volatility clustering. Table at the right presents the descriptive statistics showing that the returns are not-normally distributed and are negatively skewed.



FRANCE	
Observations	198
Mean	0.259909
Median	0.883500
Maximum	13.14600
Minimum	-17.76700
Std. Dev.	5.654523
Skewness	-0.358270
Kurtosis	3.244610
Jarque-Bera	4.729425
Probability	0.093976

Figure 5-A.3: Graph on the left shows monthly excess market returns for French market over the full sample period. Excess market returns were defined as market returns minus the risk-free rate. The graph shows that the market displays the characteristic features financial time series with erratic returns, frequent large outlying observations, more large negative returns than positive large positive one and volatility clustering. Table at the right presents the descriptive statistics showing that the returns are not-normally distributed and are negatively skewed.



ITALY	
Observations	114
Mean	0.679342
Median	0.998000
Maximum	23.13000
Minimum	-15.64400
Std. Dev.	6.171874
Skewness	0.335480
Kurtosis	4.723246
Jarque-Bera	16.24387
Probability	0.000297

Figure 5-A.4 : Graph on the left shows monthly excess market returns for Italian market over the full sample period. Excess market returns were defined as market returns minus the risk-free rate. The graph shows that the market displays the characteristic features financial time series with erratic returns, frequent large outlying observations, more large negative returns than positive large positive one and volatility clustering. Table at the right presents the descriptive statistics showing that the returns are not-normally distributed and are negatively skewed.

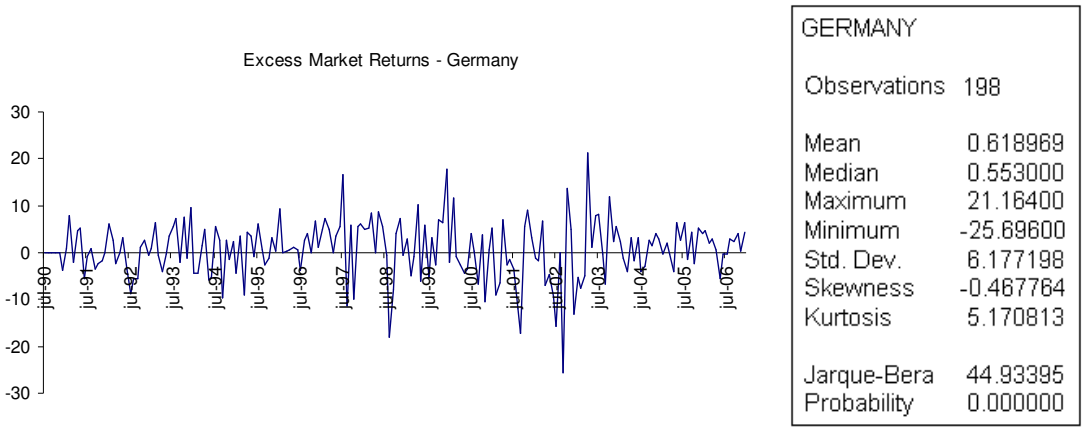


Figure 5-A.5: Graph on the left shows monthly excess market returns for German market over the full sample period. Excess market returns were defined as market returns minus the risk-free rate. The graph shows that the market displays the characteristic features financial time series with erratic returns, frequent large outlying observations, more large negative returns than positive large positive one and volatility clustering. Table at the right presents the descriptive statistics showing that the returns are not-normally distributed and are negatively skewed.

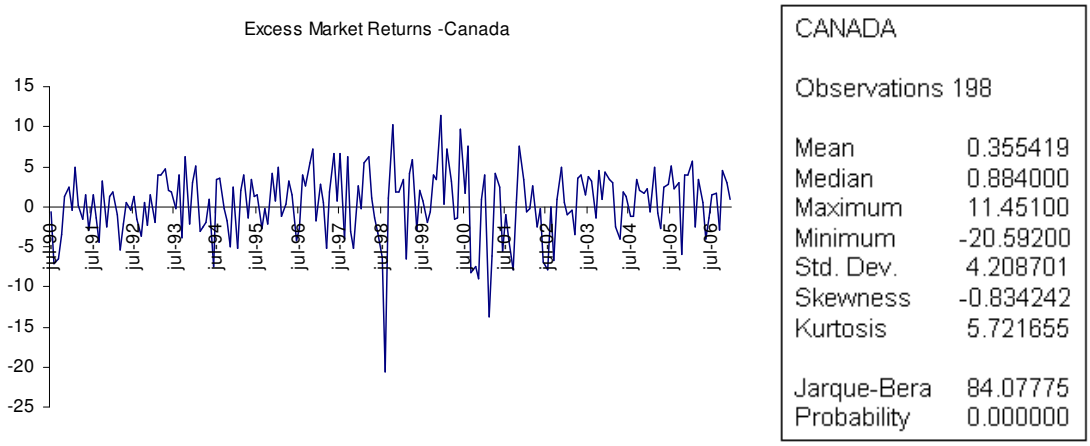
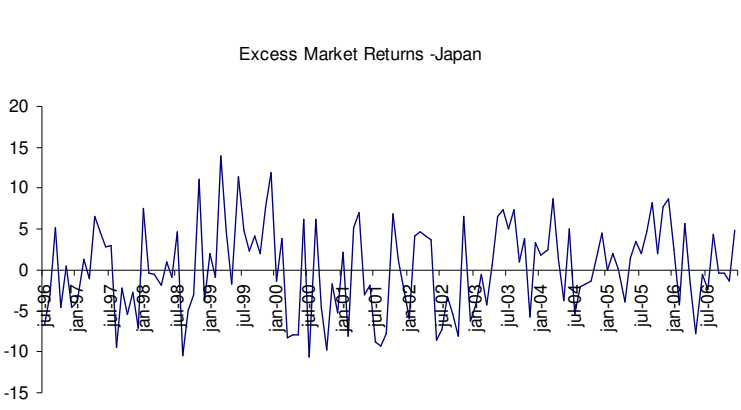


Figure 5-A.6: Graph on the left shows monthly excess market returns for Canadian market over the full sample period. Excess market returns were defined as market returns minus the risk-free rate. The graph shows that the market displays the characteristic features financial time series with erratic returns, frequent large outlying observations, more large negative returns than positive large positive one and volatility clustering. Table at the right presents the descriptive statistics showing that the returns are not-normally distributed and are negatively skewed.



JAPAN	
Observations	126
Mean	0.159262
Median	0.084000
Maximum	13.88300
Minimum	-10.60100
Std. Dev.	5.411655
Skewness	0.034798
Kurtosis	2.362550
Jarque-Bera	2.158727
Probability	0.339812

Figure 5-A.7: Graph on the left shows monthly excess market returns for Japanese market over the full sample period. Excess market returns were defined as market returns minus the risk-free rate. The graph shows that the market displays the characteristic features financial time series with erratic returns, frequent large outlying observations, more large negative returns than positive large positive one and volatility clustering. Table at the right presents the descriptive statistics showing that the returns are not-normally distributed and are negatively skewed.

Financial Sector Development Indicators

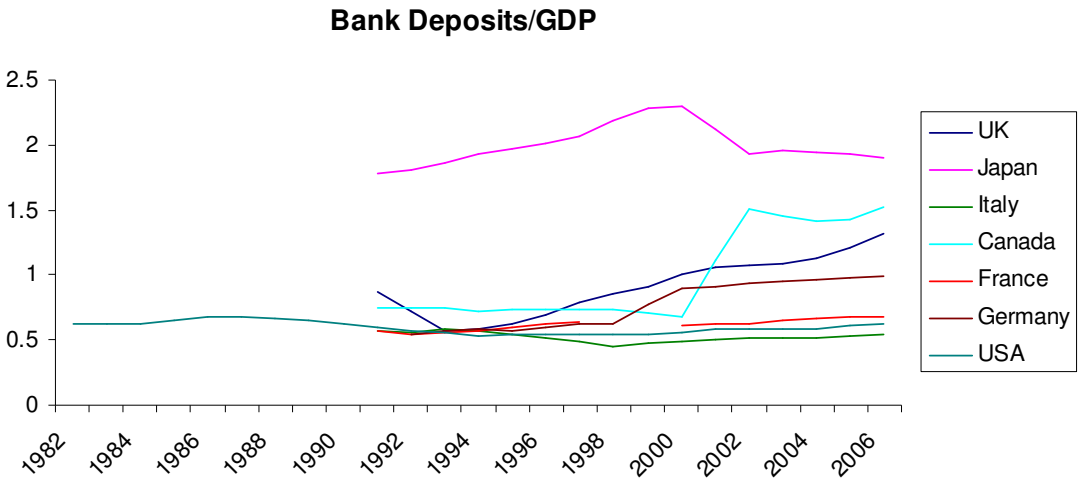


Figure 5-A.8: This graph shows the trend in the Bank Deposits/GDP ratio for G-7 countries. This ratio is widely used an indicator of Banking Sector Development. The graph shows that this indicator of banking sector development varies across the G-7 countries and there is general upward trend in this ratio over time.

Data Source: World Bank Financial Sector Development Indicators

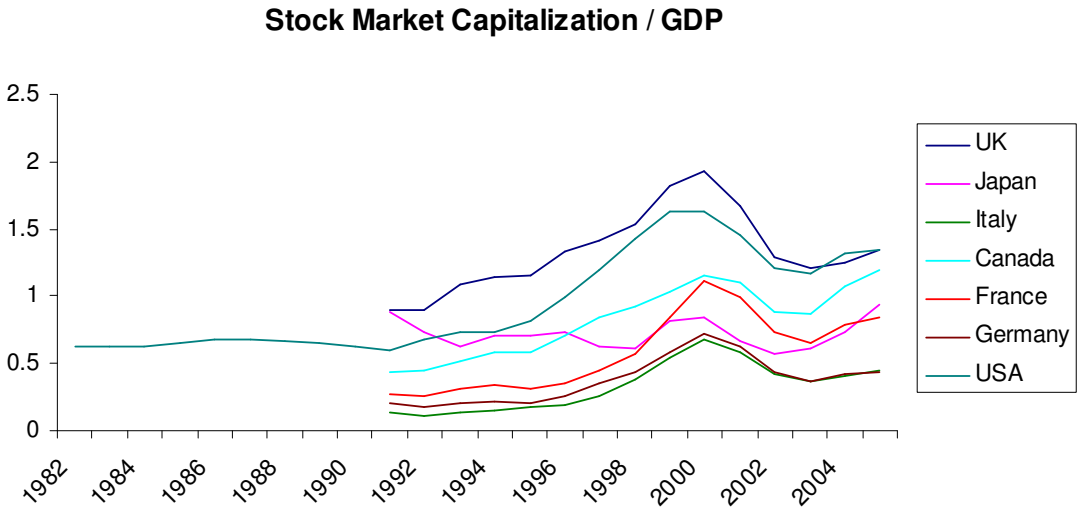


Figure 5-A.9: This graph shows the trend in the Stock Market Capitalization /GDP ratio for G-7 countries. This ratio is widely used as an indicator of Equity Market Development. The graph shows that this indicator of equity market development varies across the G-7 countries and there is a fairly high degree of co-movement in this indicator.

Data Source : World Bank Financial Sector Development Indicators

APPENDIX B

Correlation Matrices

Table 5-B.1

Correlation Matrix - US

This table shows the cross correlations between the four factors which were used as the explanatory variables. Left panel of the table shows the coefficient of correlations for the full sample period. The respective t-statistics are mentioned in the right panel of the table

	Rm-Rf	*SMB*	*HML*	*FC*	*Rm-Rf*	*SMB*	*HML*	*FC*
	Coefficients				t-stat			
Rm-Rf	1				-			
SMB	0.198	1			3.452***	-		
HML	-0.497	-0.434	1		-9.790***	-8.230***	-	
FC	0.184	0.115	-0.066	1	3.204***	1.978**	-1.125	-

**** significant at 1%, **significant at 5%, *significant at 10%*

Table 5-B.2

Correlation Matrix - UK

This table shows the cross correlations between the four factors which were used as the explanatory variables. Left panel of the table shows the coefficient of correlations for the full sample period. The respective t-statistics are mentioned in the right panel of the table

	Rm-Rf	*SMB*	*HML*	*FC*	*Rm-Rf*	*SMB*	*HML*	*FC*
	Coefficients				t-stat			
Rm-Rf	1				-			
SMB	-0.293	1			-4.290***	-		
HML	0.115	0.063	1		1.621	0.884	-	
FC	0.233	0.087	-0.134	1	3.354***	1.223	-1.893*	-

**** significant at 1%, **significant at 5%, *significant at 10%*

Table 5-B.3

Correlation Matrix - France

This table shows the cross correlations between the four factors which were used as the explanatory variables. Left panel of the table shows the coefficient of correlations for the full sample period. The respective t-statistics are mentioned in the right panel of the table

	Rm-Rf	*SMB*	*HML*	*FC*	*Rm-Rf*	*SMB*	*HML*	*FC*
	Coefficients				t-stat			
Rm-Rf	1				-			
SMB	0.121	1			1.707*	-		
HML	-0.341	-0.235	1		-5.078***	-3.385***	-	
FC	0.088	0.231	-0.036	1	1.237	3.324***	-0.504	-

**** significant at 1%, **significant at 5%, *significant at 10%*

Table 5-B.4

Correlation Matrix - Italy

This table shows the cross correlations between the four factors which were used as the explanatory variables. Left panel of the table shows the coefficient of correlations for the full sample period. The respective t-statistics are mentioned in the right panel of the table

	Rm-Rf	*SMB*	*HML*	*FC*	*Rm-Rf*	*SMB*	*HML*	*FC*
	Coefficients				t-stat			
Rm-Rf	1				-			
SMB	0.127	1			1.355	-		
HML	-0.083	0.097	1		-0.881	1.034	-	
FC	0.158	0.231	-0.116	1	1.693*	2.513**	-1.236	-

**** significant at 1%, **significant at 5%, *significant at 10%*

Table 5-B.5

Correlation Matrix – Germany

This table shows the cross correlations between the four factors which were used as the explanatory variables. Left panel of the table shows the coefficient of correlations for the full sample period. The respective t-statistics are mentioned in the right panel of the table

	Rm-Rf	*SMB*	*HML*	*FC*	*Rm-Rf*	*SMB*	*HML*	*FC*
	Coefficients				t-stat			
Rm-Rf	1				-			
SMB	0.127	1			1.793*	-		
HML	-0.239	-0.091	1		-3.446***	-1.279	-	
FC	0.083	0.113	-0.061	1	1.166	1.592	-0.856	-

**** significant at 1%, **significant at 5%, *significant at 10%*

Table 5-B.6

Correlation Matrix – Canada

This table shows the cross correlations between the four factors which were used as the explanatory variables. Left panel of the table shows the coefficient of correlations for the full sample period. The respective t-statistics are mentioned in the right panel of the table

	Rm-Rf	*SMB*	*HML*	*FC*	*Rm-Rf*	*SMB*	*HML*	*FC*
	Coefficients				t-stat			
Rm-Rf	1				-			
SMB	0.157	1			2.226**	-		
HML	-0.317	-0.138	1		-4.679***	-1.951*	-	
FC	0.097	0.088	-0.231	1	1.364	1.237	-3.324***	-

**** significant at 1%, **significant at 5%, *significant at 10%*

Table 5-B.7

Correlation Matrix – Japan

This table shows the cross correlations between the four factors which were used as the explanatory variables. Left panel of the table shows the coefficient of correlations for the full sample period. The respective t-statistics are mentioned in the right panel of the table

	Rm-Rf	*SMB*	*HML*	*FC*	*Rm-Rf*	*SMB*	*HML*	*FC*
	Coefficients				t-stat			
Rm-Rf	1				-			
SMB	-0.143	1			-1.609	-		
HML	-0.109	-0.153	1		-1.221	-1.724*	-	
FC	0.211	0.103	-0.131	1	2.404**	1.153	-1.471	-

**** significant at 1%, **significant at 5%, *significant at 10%*

Table 5-B.8

Average GDP Growth Rates

This table shows the average real GDP growth rates of G-7 countries during the full sample period and two equal-sized sub-samples. The sample period varies from 1982-2006 for the US to 1997-2006 for Italy.

% per year

	Canada	US	France	Germany	Italy	UK	Japan
Full Period	2.890	3.142	1.914	1.618	1.344	2.258	1.506
1st Half	2.254	2.986	1.609	1.664	2.055	2.005	1.208
2nd Half	3.606	3.310	2.256	1.566	0.632	2.543	1.865

Data Source: World Bank World Development Indicators

APPENDIX 5-C

Data Definitions for Compustat Global to Construct KZ Index

KZ Index = -1.002×Cashflows/K+ 0.283×Q + 3.139×Leverage
- 39.368× Dividends/K - 1.315 × Cash/K

Where;

Cashflows = item 32, net income + item 33, extraordinary item + item 11, depreciation and amortization

Q = (item 89, total liabilities and stockholders' equity + December market equity – item 146, total common equity – item 105, deferred taxes)/(item 89, total liabilities and stockholders' equity)

Leverage = (item 106, long-term debt + item 94, debt in current liabilities)/(item 106, long-term debt + item 94, debt in current liabilities + item 135, stockholders' equity)

Dividends = item 35, common dividends + item 36, preferred dividends

Cash = item 60, cash and short-term investments

K= item 76, fixed assets(net)

6

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